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THESIS

SOCIOECONOMIC STATUS AND PERFORMANCE IN THE US NAVY AND US AIR FORCE

by

Rebecca L. Harper

and

Carl R. Heldreth

March 1998

Thesis Co-Advisors:

Michael D. Cook

Mark J. Eitelberg

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FOREWORD

This thesis is part of a research project conducted at the Naval Postgraduate School (NPS) in 1997-1998. The project--"Study of Socioeconomic Status and Personnel Performance in the Military"--was supported by the Office of the Secretary of Defense and undertaken by a team of researcher that included Dr. Mark J. Eitelberg, Dr. Michael D. Cook, Captain Kevin M. Schmiegel, USMC, Captain Stefan J. Booth, USMC, and the authors of this thesis. The background work, literature review, database development, and statistical analyses for the NPS study were thus accomplished as a team effort. For ease of exposition, team members decided to prepare two separate master's theses: one that focused on the Navy and Air Force; and another that looked exclusively at the Army and Marine Corps. It should be noted that, because of the nature of the research project and combined contributions of team members, both theses draw heavily from the same background information and general findings. Consequently, major portions of this thesis are duplicated in the other work: Kevin M. Schiemgel and Stefan J. Booth, *Socioeconomic Status and Performance in the US Army and US Marine Corps*, Master's Thesis, Naval Postgraduate School, Monterey, California, March 1998. Additionally, selected results of the two theses will be incorporated in a separate study by Eitelberg and Cook, scheduled for publication as an NPS technical report in 1998.

REPORT DOCUMENTATION PAGE			Form Approved. OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.				
1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE March 1998		3. REPORT TYPE AND DATES COVERED Master's Thesis
4. TITLE AND SUBTITLE SOCIOECONOMIC STATUS AND PERFORMANCE IN THE US NAVY AND US AIR FORCE				5. FUNDING NUMBERS
6. AUTHOR(S) Harper, Rebecca L., and Heldreth, Carl R.				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000				8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSORING / MONITORING AGENCY REPORT NUMBER
11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.				
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.				12b. DISTRIBUTION CODE
13. ABSTRACT (maximum 200 words) Policy makers concerned about population representation in America's armed forces have frequently referred to the "unfair burden" of military service borne by young people from lower socioeconomic backgrounds. The purpose of this study was to examine the socioeconomic status (SES) of recruits in the Navy and Air Force and to analyze the relationship between a recruit's SES background and his or her performance in the military over time. Data for this study were obtained from three sources: the Department of Defense Survey of Recruit Socioeconomic Backgrounds (SES survey), Military Entrance Processing Command enlisted cohort files, and personnel data files provided by the Navy and Air Force. After merging these data files, the SES survey respondents were tracked longitudinally, and several analyses were undertaken to assess the relationship between SES and performance in the military. The results of this research show that recruits in both services come from slightly lower SES backgrounds than do youths in the general population; and, most of this difference can be explained by the fact that sailors and airmen are consistently underrepresented in the highest measures or correlates of SES and overrepresented in the lowest ones. Additionally, it was found that, while SES is not a strong predictor of first-term enlisted attrition in either service, it does explain differences in recruits' performance on-the-job in the Air Force. Further research is recommended, especially that which incorporates supervisors' ratings of military performance.				
14. SUBJECT TERMS Socioeconomic Status, Performance, USN, USAF				5. NUMBER OF PAGES 126
				16. PRICE CODE
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT UL	

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**SOCIOECONOMIC STATUS AND PERFORMANCE
IN THE US NAVY AND US AIR FORCE**

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MASTER OF SCIENCE IN MANAGEMENT

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ABSTRACT

Policy makers concerned about population representation in America's armed forces have frequently referred to the "unfair burden" of military service borne by young people from lower socioeconomic backgrounds. The purpose of this study was to examine the socioeconomic status (SES) of recruits in the Navy and Air Force and to analyze the relationship between a recruit's SES background and his or her performance in the military over time. Data for this study were obtained from three sources: the Department of Defense Survey of Recruit Socioeconomic Backgrounds (SES survey), Military Entrance Processing Command enlisted cohort files, and personnel data files provided by the Navy and Air Force. After merging these data files, the SES survey respondents were tracked longitudinally, and several analyses were undertaken to assess the relationship between SES and performance in the military. The results of this research show that recruits in both services come from slightly lower SES backgrounds than do youths in the general population; and, most of this difference can be explained by the fact that sailors and airmen are consistently underrepresented in the highest measures or correlates of SES and overrepresented in the lowest ones. Additionally, it was found that, while SES is not a strong predictor of first-term enlisted attrition in either service, it does explain differences in recruits' performance on-the-job in the Air Force. Further research is recommended, especially that which incorporates supervisors' ratings of military performance.

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LIST OF ACRONYMS

AFQT	Armed Forces Qualification Test
AFPC	Air Force Personnel Center
AFSC	Air Force Specialty Codes
AVF	All-Volunteer Force
BMTC	Basic Military Training Center
BUPERS	Bureau of Naval Personnel
CPS	Current Population Survey
DMDC	Defense Manpower Data Center
DoD	Department of Defense
EPR	Enlisted Performance Report
ISC	Interservice Separation Codes
Logit	Logistic regression analysis
MLE	Maximum Likelihood Estimation
MEPCOM	Military Entrance Processing Command
MSEI	Male Socioeconomic Index
NPS	Non-prior service
OLS	Ordinary Least Squares
OSD	Office of the Secretary of Defense
POPREP	Population Representation in the Military Services
SAS	Statistical Analysis System
SEI	Socioeconomic Index
SES	Socioeconomic Status
SES Survey	Department of Defense Survey of Recruit Socioeconomic Backgrounds
SSN	Social Security Number
TSEI	Total Socioeconomic Index
USA	United States Army
USAF	United States Air Force
USMC	United States Marine Corps
USN	United States Navy
WAPS	Weighted Airman Promotion Score

E-1 through E-3 are junior enlistees

E-4 through E-6 are mid-grade enlistees

E-7 through E-9 are senior enlistees

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ACKNOWLEDGMENTS

The authors wish to express their deep appreciation to the many people who contributed to this thesis. In particular, we thank Helen Davis and Dennis Mar for their assistance and patience in programming and molding the raw data. To Professors Mark Eitelberg and Mike Cook for their insight, guidance, and personal commitment to the process of learning. To Major Gary Foster, Defense Manpower Data Center, and Airman Giocovelli, Defense Language Institute, for their assistance in understanding the Air Force promotion and evaluation system. And to Captain Kevin Schmiegel, USMC, and Captain Stefan Booth, USMC, thanks for your support in making this challenging project a success. Lastly, Commander Heldreth would like to express his sincere appreciation to his wife and children for their enduring patience during the many hours spent away from home for the study, research, and writing required for this thesis.

I. INTRODUCTION

“We have in the service the scum of the earth as common soldiers,” observed Lord Wellesley, Duke of Wellington, in 1813. Similar descriptions have been used to characterize U. S. enlisted forces both before and after the All-Volunteer Force (AVF) was introduced in 1973. During its first two centuries of existence, America, like most other nations, depended heavily on the poor, uneducated, and underprivileged to serve as enlistees. The soldiers of America’s first army were considered, by most U. S. officers, to be the “dregs of all the countries” from “the same class of men who composed the common soldiers of Europe.”¹

In the 18th and 19th centuries, the burdensome life of the rank-and-file was typically endured by America’s less valued citizens; and virtually anyone willing to withstand the hardships of service life was accepted for duty. While the sons of poor farmers, laborers, and immigrants were forced to join out of economic necessity, others who were bright or skilled enough to find civilian employment typically ignored the call to serve as enlistees. In times of peace, no one seemed to question the harsh conditions of military service. The issue of socioeconomic representation in the military, however, received significantly more attention during times of war, when men of poor backgrounds were drafted and died on the battlefield in larger proportions than the more privileged or occupationally skilled.

Throughout America’s history, its wellborn sons have found ways to “dodge” the country’s draft laws, which often provided them with the necessary escapes and

¹ From Mark J. Eitelberg, *Manpower for Military Occupations* (Washington , DC: Office of the Assistant Secretary of Defense [Force Management and Personnel], 1988), p. 4.

exclusions to forge ahead with their education and careers. During the Revolutionary and Civil Wars, for example, compulsory service was often avoided by the “rich,” who could hire “poor” substitutes to fight on their behalf. The draft system implemented during World War I was designed to shelter the educated and skilled as it categorized and conscripted Americans according to their “value to society.” And statistics from the battlefields of Vietnam further supported arguments that America’s lower social classes were overrepresented in times of war.

Policy makers concerned about the disproportionate use of recruits from lower socioeconomic backgrounds to man U. S. forces have frequently referred to the “unfair burden” of military service borne by these citizens. When the post-World War II draft officially ended in 1973, concerns about the social composition of the force not only continued, but intensified. In addition to several studies that evaluated the socioeconomic status (SES) of recruits in the post-draft military, the Department of Defense (DoD) has paid particular attention to the demographic composition of its service members. Continuing interest in identifying the SES of military recruits, and tracking changes in SES representation, led to development of the DoD Survey of Recruit Socioeconomic Backgrounds (commonly referred to as the “SES survey”) in March of 1989. The general results of the survey have been presented since 1991 in DoD’s annual report on *Population Representation in the Military Services* (POPREP).

Another area of particular interest to military manpower officials involves the possible relationship between a recruit’s SES background and his or her performance in the military. For example, differences in SES may help to explain the high rates of attrition among first-term enlisted personnel as well as several performance measures that

determine promotion in each of the services. In light of these interests, a special database was created by the authors of this study. The SES survey results were linked with historical data files for each cohort of new recruits entering the Navy (USN) and Air Force (USAF) during fiscal years 1989 through 1995, making it possible to track the composition of enlisted forces and the service careers of persons who participated in the survey.

The purpose of this thesis is twofold: to examine the SES background characteristics of recruits in the USN and USAF in comparison with the general population; and, to analyze the relationship between a recruit's SES background and his or her performance in the military over time. This study follows several steps to accomplish these objectives. In Chapter II, the authors provide a detailed background and historical perspective of socioeconomic representation in the armed forces. The background discussion also includes a review of several studies that are related to the topics of SES and performance in the military. Chapter III explains how the database was created for this study as well as the methodology used to determine the relationship between SES and performance in the USN and USAF. The results of the cross tabulation analysis and linear and logit multivariate models are provided in Chapter IV. And, finally, in Chapter V, the authors draw several conclusions based on these results and offer recommendations for future research using this study's database.

II. BACKGROUND

A. INTRODUCTION

In the military's ongoing efforts to recruit and retain the "right kinds of people," manpower policy makers have struggled not only to regulate the quantity and quality of new soldiers, sailors, airmen, and Marines but to monitor the background characteristics of enlisted forces.² Although socioeconomic representation in the military received significant attention with the introduction of the AVF in 1973, imbalances in the social composition of U. S. forces have existed since our colonial fathers "stood up" an army at Concord in 1775. A review of the history of conscription and volunteerism in the United States reveals striking similarities between the socioeconomic composition of the force under the draft and the AVF.³ Similarly, military manpower policies in both eras have been shelved, altered, and implemented based on considerations for socioeconomic representation.

One of the more persistent concerns about the AVF has been its presumed inability to attract a representative cross section of the American population and the related issue of social equity or "fairness."⁴ Representativeness in the armed forces has been pursued for several reasons. Critics of the AVF argued that a "professional" army would not only create gaps between the military and the rest of society, but that military

² Sue E. Berryman, "Images and Realities: The Social Composition of Nineteenth and Twentieth Century Enlisted Forces," in D. R. Segal and H. W. Sinaiko, eds., *Life in the Rank and File* (McLean, VA: Pergamon Brassey's International Defense Publishers, 1986), p. 10.

³ Richard V. L. Cooper, *Military Manpower and the All-Volunteer Force* (Santa Monica, CA: RAND Corporation, 1977), p. 206.

⁴ Martin Binkin, *America's Volunteer Military: Progress and Prospects* (Washington, DC: The Brookings Institution, 1984), p. 20.

effectiveness would suffer as a result of the AVF's failure to recruit youth from middle-to upper-class backgrounds. Yet, the estimated effects of the AVF on military isolationism and readiness were highly subjective and difficult to measure. Several politicians, therefore, relied on the issue of "fairness" to discredit the concept of volunteerism.

History--two hundred years of the disproportionate and inequitable treatment of our less fortunate citizens--fueled arguments against the AVF. With statistics from past wars, government officials possessed the historical data that they needed to voice their positions. In the 1980s, social equity served as the platform for senators and representatives who called the AVF a "glaring civil wrong," and echoed concerns, first expressed during the Civil War, with the familiar words: "it is the poor of the country whose blood is shed."⁵ Social composition became a debate about the "benefits" and "burdens" of military service borne by the lower classes during times of peace and war, respectively.

The definition of who constitutes the "right" young recruit has changed in concert with the growing technological demands of the military. Nevertheless, the basic need for good manpower and concerns about the demographic composition of our fighting forces have remained constant over time and will continue throughout the unforeseeable future.⁶ Recent controversy over possible subgroup differences in the performance of military-specific tasks has focused attention on the possibility that performance differences may be attributed to SES, not simply to membership in a specific demographic category. When choosing the "right" force, policy makers must carefully balance issues of social

⁵ Senator Ernest F Hollings and Representative Paul Simon, quoted in Binkin, *America's Volunteer Military: Progress and Prospects*, pp. 20-21.

⁶ Eitelberg, *Manpower for Military Occupations*, p. 3.

representation and concerns for inequity with differences in individual and unit performance and the ability of each service to accomplish its assigned mission.

Historically, and most likely in response to recurring concerns about social equity, manpower analysts have used SES to compare the composition of enlisted forces with the rest of American society. Yet, the effect of SES on military performance has never been explicitly measured. If history repeats itself, we can expect that concerns about “social representation” will resurface in debates about the AVF--ultimately affecting the policies used when choosing the “right” people.⁷ The question is: In assessing what is “right” in the future, should manpower policy makers consider the relationship between SES and performance or strictly concentrate on mirroring a broad cross-section of American society to achieve fairness or representativeness?

B. LITERATURE REVIEW

A review of the literature that addresses socioeconomic status in the military reveals some noteworthy trends. Although several authors cite the term “socioeconomic status” in their studies, “there is no general consensus regarding how to define and measure this construct.”⁸ Conversely, most authors agree that a detailed historical perspective is necessary to support a systematic analysis and conclusions about social representation in the military before and after creation of the AVF. Several authors--including Cooper (1977), Fredland and Little (1982), and Fernandez (1989)--have found that differences between the social composition of the enlisted force and the general

⁷ From Berryman in *Life in the Rank and File*, p. 10.

⁸ Department of Defense, *Population Representation in the Military Services, Fiscal Year 1995* (Washington, DC: Office of the Assistant Secretary of Defense [Force Management and Personnel], 1996), p. 7-2.

population are relatively modest and have changed little since the inception of the AVF. No studies, however, could be found that examined the effect of SES on performance in the military.

Previous literature provides several significant "lessons learned" regarding the study of SES in the military. Although SES is generally defined as an indicator of economic and social position,⁹ the definition used in this study largely depends on the measures and background characteristics contained in the SES survey. Second, a study of SES in the military requires an understanding of its history before and after DoD implemented the AVF. Third, the composition of enlisted accessions under both the draft and volunteer systems resembles the population as a whole with a slightly lower average SES value due to underrepresentation of the top quartile of SES among military members.¹⁰ Finally, by examining the effects of SES on performance in the military's sea and air forces, this study explores an aspect of military manpower policy not previously mentioned in debates about social composition and the AVF.

1. Defining Socioeconomic Status

Within the general populace, socioeconomic status is most commonly referred to and understood as social class. SES is typically used as a "shorthand expression for variables such as education, occupation, income, employment status, family background, and tangible possessions that characterize an individual's capacity to create or consume

⁹ Cathy A. Stawarski and David Boesel, *Representation in the Military: Socioeconomic Status* (Alexandria, VA: Human Resources Research Organization, 1988), p. 8.

¹⁰ See *Population Representation in the Military Services, FY 1991-1995*.

goods that are valued in our society.”¹¹ Research suggests that occupation best explains socioeconomic position and that additional variables, such as education and income, can significantly increase explained variance in social class. Although education, occupation, and income are consistently used to assess SES, most studies define and measure this construct differently because of the “convenience and availability” of certain measures that may explain unique dimensions of SES and represent the construct more completely.¹²

One way of measuring SES is the socioeconomic index (SEI), devised by Stevens and Cho in their 1985 study, *Socioeconomic Indices and the New 1980 Census Occupational Classification Scheme*, which attempts to quantify socioeconomic status based on parental occupation alone. Stevens and Cho devised a summary statistic for SES in their 1985 study using predicted prestige scores based on levels of annual income and education within occupations.¹³ Their study utilized the work of Duncan (1961), who attempted to estimate socioeconomic scores in an effort to counteract the lack of prestige scores for most occupational titles.¹⁴ Duncan estimated SEI scores by regressing prestige scores from a 1947 study on age-standardized occupational levels of earnings and education for a limited set of occupations obtained from 1950 census data. He then

¹¹ Robert M. Hauser and John R. Warren, *Socioeconomic Indexes for Occupations: A Review, Update and Critique* (Madison WI: Center for Demography and Ecology, June 1996), p. 3.

¹² Department of Defense, *Population Representation in the Military Services, FY 1995*, p. 7-3.

¹³ Gillian Stevens and Joo Hyun Cho, “Socioeconomic Indices and the New 1980 Census Occupational Classification Scheme,” *Social Science Research*, 14 (1985), pp. 142-168.

¹⁴ Otis Dudley Duncan, *A Socioeconomic Index for All Occupations*, in A. J. Reiss, Jr., eds., *Occupations and Social Status* (New York, NY: Free Press, 1981), pp. 139-161.

applied the weights for earnings and education levels to all other occupations to obtain predicted prestige scores.

While Stevens and Cho found that SEI scores for 1980 occupational titles appeared to describe socioeconomic distances between occupations in a manner consistent with Duncan's findings,¹⁵ the more recent work of Hauser and Warren (1996) argues that prestige-validated socioeconomic indices are of limited value, because they give too much weight to occupational earnings. Differences in definitions of variables, functional form, and treatment of outliers result in significant changes in SEI in their study. Hauser and Warren found that levels of occupational education alone, as opposed to weighted combinations of educational levels and earnings, better defined the main dimension of occupational persistence across and within generations and provided a more useful estimation procedure to index occupations.¹⁶ Despite their differences, the development of an SEI in all three studies provides future researchers with important frameworks to better measure occupation, the best single indicator of SES.

2. Historical Perspective

Socioeconomic status of enlisted accessions in the military became a controversial social and political issue with the introduction of the AVF in 1973. Although a primary goal of the AVF was to correct the injustices of conscription borne by the lower classes of American society, opponents of the volunteer system often referred to issues of social misrepresentation when arguing against the removal of the draft. Fears that the poor and blacks would bear an "unfair" burden in the nation's defense--and that a volunteer

¹⁵ See Stevens and Cho, pp. 167-168.

¹⁶ See Hauser and Warren, pp. 2, 68-69.

military would distance itself from the rest of society as an “employer of last resort”--were unfounded in light of the draft’s sordid history and its consistent failure to represent the general population.¹⁷

Before we determine whether or not social class can be linked to differences in military performance, we should first consider the make-up of our enlisted forces in a larger historical context. As history and traditions continue to serve both proponents and opponents of an all-volunteer military, we should examine the background characteristics of the common soldier in armed forces that have enjoyed success under systems of nationwide conscription and varying degrees of volunteerism.

a. *The Colonial Era*

With the birth of the “citizen militia” in 1775, the upper class relinquished the noble privilege of military service, and the right and obligation of citizen participation in armies became the future standard of American military tradition. Although every able-bodied man was considered part of the colonies’ “defense establishment” prior to the War of Independence, consolidation into a continental army became necessary with the Revolution.¹⁸ The harsh conditions and hardships associated with service life did not attract the well-educated, skilled, or those with a propensity to marry and raise children; the enlisted men of the colonial era were poor--penniless drifters with no property or family ties and “a bad reputation

¹⁷ Cooper, p. 204.

¹⁸ Ibid., p. 47.

with the general public.”¹⁹ The colonial forces of the Revolutionary War filled its rank and file with men who possessed the minimum requirements of an “able body.” A continental army with no concerns for the morale and welfare of its troops was forced to accept almost any man who could walk, talk, see, and hear, and would continue to do so for the next 50 years under conditions of military service that could be characterized as “criminally negligent.”²⁰

Implementation of a standing Federal army following the Revolution received some consideration, but never materialized. State militias continued to provide the necessary military manpower through the end of the 18th century and American expansionist efforts in the War of 1812. Consistent with opposition to a federal system of conscription and the infeasibility of a career enlisted force, no great effort was made to improve the burdensome life of enlistees. Enlisted volunteers in times of peace before the Civil War “comprised a rather sorry lot, recruited from the dregs of American society and the scum of the population of the older states.”²¹ Individuals with the skills and talents to earn a competitive wage as laborers and mechanics avoided peacetime military service, leaving those “infected with some moral infirmity” to pursue the menial, uninspiring existence of a recruit.²²

¹⁹ Joseph Warren, “The Dangers of Standing Armies,” *The Military in America*, pp. 21-44, as cited in Eitelberg, *Manpower for Military Occupations*, p. 4.

²⁰ Hayes, *Evolution of Armed Forces Enlisted Personnel Management Policies: Executive Summary*, p. 61 as cited in Eitelberg, *Manpower for Military Occupations*, p. 4.

²¹ Prucha (1953) as quoted in Sue E. Berryman, *Who Serves? The Persistent Myth of the Underclass Army* (Boulder, CO: Westview Press, 1988), p. 21.

²² *Ibid.*, p. 22.

b. The Civil War

Negative images of the “dregs” and “scum” who endured the “physically arduous, dirty and thankless job” of military service are part of the history and tradition of the American military during both eras of volunteerism and the draft. Less fortunate citizens would bear an unfair burden of the hardships of enlisted service life under both systems, because individuals from higher social classes chose to ignore voluntary service, joined the officer corps, or purchased substitutes to avoid conscription. While volunteerism resulted in “economic conscription” of the poor and underprivileged, draft laws typically provided escapes and exclusions for the more privileged, educated, and occupationally skilled, as evidenced in the country’s first draft laws, which effectively shackled society’s lower classes.

Under systems of conscription implemented in the South and North during the Civil War, the burden of war was disproportionately borne by individuals who had not “enjoyed a fair share of society’s benefits.”²³ For example, the Union’s Enrollment Act of 1863 allowed the rich to pay others to serve for them, or, worse yet, pay the government \$300 to buy a substitute on their behalf. “Rich man’s money, poor man’s blood” became a popular complaint of the masses as the Civil War dragged on, and the battlefields were no longer stained with the blood of “men who had given up good situations to enlist.” From the Revolution to the Civil War, the poor and unskilled endured “starvation, rags, dirt and vermin,” and ultimately gave their lives in alarmingly unfair proportions. Meanwhile, wellborn citizens, protected by their roles and status in

²³ Martin Binkin, *Who Will Fight the Next War? The Changing Face of the American Military* (Washington, DC: The Brookings Institution, 1993), p. 61.

society, were able to elude military service in the enlisted forces using their socioeconomic advantage.²⁴

c. *The World Wars*

Little changed with the draft system established during the First World War, as the government classified all male registrants according to their “value” to the civilian sector. Conscription became the basis for all enlisted accessions in 1917, and the working class again shouldered an unrepresentative portion of the warfighting effort.²⁵ Registrants were ranked and inducted according to their value to society, generally measured by income, educational attainment, skill level, and marital/family status, leading to an over-representation of the poor and black on the battlefield. One in eight draftees was black at this time, and one in six was an immigrant. Individuals deemed most valuable to the civilian sector were categorized as Class V, while the least-valued individuals were drafted first as Class I registrants. It is no wonder that the average World War I draftee was an uneducated, unmarried man in his early twenties who was more likely to be illiterate, unskilled, and poorer than the average man of the same age in the civilian sector.²⁶

The military draft would be used to fill the ranks of the U. S. Army for the next three episodes of war from 1940 to 1973. Except for an 18-month lapse just after World War II, conscription was necessary to enforce foreign policy and ensure preparedness. Although American society had accepted the obligation of its citizens to

²⁴ This paragraph contains several excerpts from Eitelberg, *Manpower for Military Occupations*, p. 7.

²⁵ Cooper, p. 51.

²⁶ Berryman in *Life and the Rank and File*, p. 21.

serve as World War II came to an end, opposition to the draft would continue to reappear over the next three decades. During the world's largest war, 16 million Americans served in the armed forces, and escapes and exclusions for the skilled and educated became the exception rather than the rule. In fact, a study of SES and educational attainment of veterans and non-veterans from World War II to 1973 found that veterans prior to Vietnam came from families with higher SES backgrounds than non-veterans. However, the data may have represented upwardly biased estimates of the characteristics of U. S. enlisted forces in World War II and the Korean War, because officers were included as veterans.²⁷ In the wake of massive mobilization and the "fair" representation of enlisted forces during the Second World War, policy makers began to reexamine the usefulness of conscription. Proponents of volunteerism raised issues of preparedness and questioned the cost-saving methods of "standing up an Army for the next war."²⁸

Draft systems imposed on the American population from the Revolution through the First World War heavily overrepresented the poor. Higher classes of men either benefited from draft boards, which inducted "less-valued" citizens, or they avoided service by pulling strings and hiring substitutes. Although discrimination was less overt with the introduction of peacetime conscription following World War II, the rich could still find ways to avoid service if they had the will to pursue self-serving goals. College deferments and draft-exempt jobs resulted in a system of conscription that continued to

²⁷ Berryman, *Who Serves? The Persistent Myth of the Underclass Army*, p. 39.

²⁸ Cooper, p. 49.

exploit the poor, as less fortunate citizens were called upon to serve in disproportionately large numbers and were paid far less than the market-clearing wage.²⁹

d. The Vietnam Era

Debates about the social representativeness of the military resurfaced during the 1950s and 1960s, as classes of people were “channeled” in opposite directions by a Selective Service System that acted as a human resource planner, creating excuses and escape routes for the wealthy.³⁰ As the Vietnam conflict began to resemble “wars” of the past, reports from Southeast Asia showed a disproportionate number of young men from relatively poor backgrounds dying on the battlefield. Early casualty reports from the Vietnam War showed that African-Americans accounted for 20 percent of Army combat deaths from 1961 to 1966.³¹ These reports prompted civil rights leaders to criticize the nation and its military for unjustly using disadvantaged minorities as “cannon fodder.”

Concerns about possible racial and social class connections with the draft prompted the establishment of the National Advisory Commission on Selective Service. In its February 1967 report, the commission emphasized social equity and argued that various racial, social, and economic groups should be represented in the military in times of peace and war in rough proportion to their percentage in the general population.³² At about the same time, the Johnson Administration was introducing “Project 100,000,” a

²⁹ Ibid., p. 205.

³⁰ Martin Binkin and Mark J. Eitelberg, *Blacks and the Military* (Washington, DC: The Brookings Institution, 1982), p. 76.

³¹ Ibid.

³² Binkin, *Who Will Fight the Next War? The Changing Face of the American Military*, p. 69.

program specifically designed to lower aptitude standards for draftees and voluntary enlistees. Project 100,000 opened the doors of military service even wider to America's lower classes and helped to bring social representation to the forefront as a sensitive political issue.

When Richard Nixon first proposed ending the draft during the 1968 presidential campaign, opponents and proponents of an all-volunteer force had already established their arguments and chosen sides. The deaths of tens of thousands of young American men sparked the debate about conscription among scholars and legislators, and claims that most servicemen came from relatively poor backgrounds added fuel to the fire.³³ Experts from both sides argued about the consequences of removing the draft and offered alternatives to shift the unfair burden borne by the lower classes. While advocates of volunteerism argued that no system of military conscription could ever be considered "fair" and promoted the AVF as a remedy for the injustices of conscription borne by the poor and blacks, supporters of the draft system examined ways to change existing draft laws to better represent the general population. Opponents of the AVF warned against "economic conscription," arguing that removal of the draft would force the nation's poor to enlist in the military--selected by the "invisible hand of their own poverty."³⁴

³³ See, for example, Lawrence M. Baskir and William A. Strauss, *Chance and Circumstance: The Draft, The War, and The Vietnam Generation* (New York, NY: Random House, Inc., 1978) and Gilbert Badillo and David Curry, "Social Incidence of Vietnam Casualties," *Armed Forces & Society*, Vol. 2, May 1976, p. 397.

³⁴ Eitelberg, *Manpower for Military Occupations*, pp. 7-8.

e. *All-Volunteer Force: 1973 to the 21st Century*

Arguments against ending the draft were reviewed by the President's Commission on an All-Volunteer Armed Force soon after Richard Nixon's election in 1968. When addressing the issue of socioeconomic representation and related concerns for fairness, the President's Commission asserted that the AVF would not differ significantly from a force composed of volunteers and conscripts. The Commission emphasized the consistent use of enlistment criteria to answer claims that only the lowest economic classes would be attracted to the AVF. According to the Commission, "maintenance of current mental, physical, and moral standards for enlistment will ensure that a better paid, volunteer force will not recruit an undue proportion of youths from lower socioeconomic backgrounds."³⁵

Similar concerns about the social composition of U. S. enlisted forces intensified in the 1970s and 1980s and continued to surface as the nation approached the 21st century. Images of America's founding fathers and the quality of the common Revolutionary soldier spring to mind in the words of a *Washington Post* article entitled "Draft," written in 1981: "the very poor, the ill-educated, the hapless, the hopeless and, by some accounts, the incompetent, are paid to do the defending the rest of us are loath to do."³⁶ Similarly, the inequities of the draft systems imposed during the Civil War and World War I resound in a 1988 report by the Democratic Leadership Council, which warns that "we cannot ask the poor and under-privileged alone to defend us while our

³⁵ The President's Commission on an All-Volunteer Force, *The Report of the President's Commission on an All-Volunteer Force*, p. 16.

³⁶ Quoted in Eitelberg, *Manpower for Military Occupations*, p. 8.

more fortunate sons and daughters take a free ride, forging ahead with their education and careers.”³⁷

As history repeats itself, and manpower policy makers, congressional committees, and government agencies wrestle with the task of selecting the “right” force in today’s technologically-advanced world, particular attention will be paid to social representation. When the draft officially ended in 1973, critics anticipated the dangerous consequences of a system that recruited primarily from the underclass. Fears that the military would become a substitute for the nation’s welfare system and visions of a mercenary force motivated by pay prompted scathing objections to the AVF, particularly among members of Congress who had been opposed to Nixon’s initiative. While government officials voiced opposition to a program that failed to equitably represent society, analysts and political commentators predicted the creation of a serious cleavage between the military and the rest of society under the AVF.³⁸ At congressional urging, DoD began to carefully monitor the military’s ability to represent a broad cross-section of American society. DoD was also instructed by Congress to prepare an annual report that would track the demographic characteristics of recruits. At the same time, social and behavioral scientists began to study the implications of changes in population representation within the military.

³⁷ Democratic Leadership Council, *Citizenship and National Service: A Blueprint for Civic Enterprise* (Washington, DC, May 1988), p. 25.

³⁸ Morris Janowitz, “The All-Volunteer Military as a ‘Sociopolitical’ Problem,” *Social Problems*, February 1975, pp. 432-449.

3. Measuring Socioeconomic Status

Prior to 1977, many of the assertions about the social “representativeness” of the military were based on “gut” feelings, “war stories,” and emotions rather than on systematic analyses of data. Qualitative analyses often emerged during debates over the composition of the enlisted forces. The 1991 edition of DoD’s POPREP cites three systematic analyses of the socioeconomic composition of accessions prior to the development of the SES survey in 1989. All three studies found relatively modest differences between large samples of military and civilian populations. Military members, however, tended to come from backgrounds that were somewhat lower in SES than the civilian average.³⁹

a. *Prior Studies*

The first systematic attempt to evaluate socioeconomic representation in the post-draft military is Cooper’s 1977 study.⁴⁰ Cooper developed a proxy for socioeconomic background by identifying the postal ZIP codes of recruits and calculating the per capita income for each ZIP code, average family income, average educational attainment and mental aptitude, racial/ethnic composition, and other census measures. Cooper found that “there had been very little overall change in the macro distribution of enlisted accessions since the beginning of the all-volunteer force.”⁴¹ The use of mean income by ZIP code became the primary method for estimating SES representation in the military for the next 13 years.

³⁹ Department of Defense, *Population Representation in the Military Services, FY 1991*, pp. 44-45.

⁴⁰ Cooper, *Military Manpower and the All-Volunteer Force*, 1977.

⁴¹ *Ibid.*, p. 223.

In 1982, Fredland and Little used data from the National Longitudinal Survey of Youth Labor Force Behavior in a study of the socioeconomic characteristics of military personnel.⁴² Fredland and Little focused on differences between military and civilian samples (18-22 years old) based on socioeconomic backgrounds, quality as measured by education, training, health, and educational aspirations. The sample populations were also examined according to race/ethnicity, branch of service, and, for the civilian group, expression of interest in military service. The work by Fredland and Little differs from that of Cooper in terms of methodology and the treatment of demographic groups. Nevertheless, both studies were consistent in finding only minor differences between the social composition of the enlisted force and that of the general population.⁴³

A 1989 study by Fernandez used the ZIP code approach previously employed by Cooper. Fernandez analyzed more recent data on military recruits but arrived at a similar conclusion: “The socioeconomic characteristics of recruits’ home areas are broadly similar to those of the general youth population, although recruits tend to come from areas with somewhat lower family incomes and education levels.”⁴⁴ Due to limitations on information in personnel data files, Fernandez (like Cooper) assumed that a proxy for socioeconomic background could be developed by analyzing the distribution of recruits according to income levels in their home areas.

⁴² J. Eric Fredland and Roger D. Little, *Socioeconomic Characteristics of the All-Volunteer Force: Evidence from the National Longitudinal Survey (1979)* (Annapolis, MD: U. S. Naval Academy, 1982).

⁴³ Ibid., pp. 2-3.

⁴⁴ Richard L. Fernandez, *Social Representation in the U. S. Military* (Washington, DC: Congressional Budget Office, October 1989).

Each of the three studies summarized above--that of Cooper, Fredland and Little, and Fernandez--provides useful information for demographic, advertising, and marketing analyses. These studies are not as reliable, however, when comparing socioeconomic representation in the military with that of the general population.⁴⁵ For example, in Fredland and Little, several important SES variables--such as family income and SEI--are not included, and military sample sizes are exceptionally small.⁴⁶ While the direction of the bias is not clear, variances of the estimates tend to be inflated in cases of small sample size. Additionally, the authors use only five broad categories to define parental occupation. Therefore, estimates of the socioeconomic differences between military and civilian populations may not be as accurate as estimates from studies that examine a wide range of occupational categories--such as DoD's annual POPREP.

There are also several problems in using postal ZIP codes to evaluate SES representation in the military. Cooper asserts that "differences in the socioeconomic characteristics of individuals residing in any given ZIP code (intra-ZIP code variations) are relatively minor" when compared with inter-ZIP code variations; yet, many of his findings may be biased due to the treatment of individuals as aggregates. Applying community characteristics to estimate individual SES backgrounds could result in attenuation, a "smoothing" or "blending" effect, in which parameter estimates tend to be

⁴⁵ Department of Defense, *Population Representation in the Military Services FY 1995*, p. 7-3.

⁴⁶ In their analysis of SES background characteristics, Fredland and Little report sample sizes of 33, 82, and 122 for Hispanics, blacks, and whites, respectively.

biased toward zero.⁴⁷ This problem is exacerbated by the methodology used by Cooper. At the time of the study, nine digit ZIP codes were unavailable, and the analysis only uses the first few digits of the ZIP code--rather than the entire five-digit code--thus amplifying the problem of aggregation.

Several anecdotal examples are particularly useful when explaining this type of bias: A young lawyer with a lifelong subscription to *Harvard Law Review* can take a wrong turn outside of his high-rise studio apartment in Los Angeles and bump into a street-wise teenager whose only membership in life is to a local gang. A difference of one city block in Manhattan can equate to differences of millions of dollars in income and several degrees of educational attainment. And, expensive homes often share the same ZIP codes with those on the “other side of the tracks” in many urban, suburban, and rural areas throughout America. Thus, the use of mean or community SES characteristics may not always capture the “true” SES backgrounds of individuals.

In addition to these problems of attenuation, military applicants and recruits may not actually come from the background indicated by the ZIP code for their current address. Studies using ZIP codes do not account for individuals who may be raised in a specific area but move to a different location before their time of enlistment--a practice that may be significant among individuals coming from lower socioeconomic backgrounds who typically rent or have never owned a home. Data in the Cooper and Fernandez studies include ZIP codes for the recruit’s latest address and may not

⁴⁷ William H. Greene, *Econometric Analysis* (New York, NY: Macmillan Publishing Co., 1990, pp. 294-297.

necessarily reflect the “true” background characteristics of an individual who spent most of his or her life at a different address.

b. The SES Survey

Limitations in the data on the socioeconomic backgrounds of military recruits and continuing interest in SES representation in the military prompted DoD to initiate a survey of recruits’ socioeconomic backgrounds. The SES survey was first administered by the Defense Manpower Data Center (DMDC) in March 1989. The objective was to collect individually-identifiable family background information from new recruits on a continuing basis, and then match the survey data with DoD personnel files to track the socioeconomic composition of active-duty enlisted personnel. Results from the SES survey have been reported in the annual DoD POPREP report since 1990; but analyses have, thus far, been limited to cross-sectional data on the marital status of parents, education of parents, home ownership status of parents, employment status of parents, occupational category of parents, and SEI scores (based on education, income, and prestige ratings of parents’ occupations computed from responses to the survey and data from the Current Population Survey [CPS], conducted by the Bureau of the Census for the Bureau of Labor Statistics).⁴⁸ The present study attempts to extend these analyses by tracking recruits over time and examining whether SES levels are in any way connected with individual performance in the military.

4. Measuring Performance in the Military

Several studies have attempted to measure individual performance in the military. This is a difficult task for a number of reasons. First, past studies tend to define

⁴⁸ See *Population Representation in the Military Services*, FY 1991-1995.

performance as well as its independent variables differently. For instance, in 1984, Marcus and Quester used supervisors' evaluations to indicate future performance or net productivity.⁴⁹ In 1992, Cooke and Quester defined "successful" service in terms of an individual recruit's status at the end of his/her first term of enlistment.⁵⁰ Scribner et al. compared the effects of Armed Forces Qualification Test (AFQT) scores on actual tank-crew firing scores in 1986.⁵¹ And, a year later, Horne examined the relationship between scores on the AFQT and the Army Skills Qualifications Test (SQT).⁵² Second, measures of performance tend to vary across services. Personnel in the Army, Navy, Marine Corps, and Air Force are promoted for different reasons, based on criteria that typically differ by service. Variations in measures, weighting methods, and promotion rates both within and between services compound the problems encountered when measuring performance in "the military."

a. Cooke and Quester

In their 1992 study entitled, "What Characterizes Successful Enlistees in the All-Volunteer Force: A Study of Male Recruits in the U. S. Navy," Cooke and Quester examine the relationship between recruit background characteristics for men enlisting in the U. S. Navy and three successful outcomes--completion of initial obligated

⁴⁹ Alan J. Marcus and Aline O. Quester, *Determinants of Labor Productivity in the Military* (Alexandria, VA: Center for Naval Analysis, 1984).

⁵⁰ Timothy W. Cooke and Aline O. Quester, "What Characterizes Successful Enlistees in the All-Volunteer Force: A Study of Male Recruits in the U. S. Navy," *Social Science Quarterly*, Vol. 73, No. 2, June 1992, pp. 239-251.

⁵¹ Barry L. Scribner, D. Alton Smith, Robert H. Baldwin, and Robert L. Phillips, "Are Smart Tankers Better? AFQT and Military Productivity," *Armed Forces & Society*, Vol. 12, No. 2, Winter 1986, pp. 193-205.

⁵² David K. Horne, "The Impact of Soldier Quality on Army Performance," *Armed Forces & Society*, Vol. 13, 1987, pp. 443-456.

service, completion of first term of enlistment at the rank of petty officer (E-4), and retention beyond the initial enlistment contract. The authors hypothesize that attrition behavior is strongly associated with recruit characteristics observed at the time of enlistment and appearing on personnel records established at the time; and, that characteristics associated with contract completion are also generally predictive of promotion and retention. Cooke and Quester found that regular high school diploma graduates, persons with higher test scores, black or Hispanic recruits, and recruits who enter the Navy through the Delayed Entry Program are most likely to have successful outcomes. The study by Cooke and Quester demonstrates that adaptivity to military life is a strong indicator of successful job match.⁵³

b. Marcus and Quester

In their study, *Determinants of Labor Productivity in the Military*, Marcus and Quester provide useful models when examining the relationship between SES and performance in the military. Marcus and Quester provide a useful approach to account for the systematic biases that arise from the inherent subjectivity of supervisor's evaluations and differences in "location" and "scale" between supervisors.⁵⁴ Subjectivity bias, or the fact that evaluations reflect individual tastes, performance standards, and perceptions of the performance of others, is not a significant problem when the assignment of individuals to supervisors is random and the sample size is large. Systematic biases caused by differences in location (a supervisor's rating of average performance) and scale (the supervisor's perception of differences between the best and worst performers) are

⁵³ Cooke and Quester, p. 239.

⁵⁴ Marcus and Quester, pp. 9-11.

accounted for by controlling for (weighting) differences between supervisors in the regression equations.

Subjective supervisors' evaluations are currently utilized by all four services as proxies for performance. For example, the "recommendations" of immediate supervisors are major determinants in the promotion process for personnel in paygrades E-4 through E-9 in the USN and USAF. Time-in-service and training performance are the primary determinants used for promotion of personnel in paygrades E-1 through E-3. Evaluations have been important indicators of performance in the military for many years. Although evaluations are subjective, and biases exist, they are a good single source of performance measure because of the variety of quantitative and qualitative information contained in the score.

5. Performance in the USN and USAF

The present study focuses on the effect of SES on performance in the USN and USAF; therefore, an examination of differences in performance measures between the USN and the USAF is also useful. Since this study examines cohorts with up to seven years of service, particular attention is paid to first-term attrition and promotion procedures for personnel in the ranks of E-1 through E-5. While both services base promotion for junior enlisted personnel--E-1 through E-3--on time-in-grade, time-in-service, and supervisor recommendations, some differences exist between the two services regarding promotion procedures for noncommissioned officers.

The USN uses a final multiple score for promotion to the ranks of E-4 through E-6, based on, but not limited to, standard advancement examination scores, awards,

performance factor evaluations, length of service, and service in paygrade. Table 2.1 illustrates how the USN computes an individual's final multiple score. The relative weights applied to standard advancement examination scores, awards, performance factor evaluations, length of service, and service in paygrade indicate their significance as determinants of performance. Approximately two-thirds of the USN enlistee final multiple score is accounted for by a person's standard advancement examination score, and a supervisor's evaluation of performance, which alone determines almost one-third of the total score. Once sailors are eligible for promotion to E-7, their promotion is exclusively determined by the standard advancement score and evaluation of performance, and they go before a promotion board for advancement. Promotion to the senior enlisted ranks is determined--almost entirely--by subjective supervisors' evaluations called "fitness reports."

Table 2.1. Computation of USN Final Multiple Score

Promotion Factor	E-4/E-5 Maximum Points/Percent	E-6 Maximum Points/Percent	E-7 Maximum Points/Percent
Standard Score	80 / 35	80 / 30	80 / 60
Performance Factor	70 / 30	92 / 35	52 / 40
Length of Service	30 / 13	34 / 13	--
Service in Paygrade	30 / 13	34 / 13	--
Awards	10 / 4.5	12 / 4.5	--
PNA*	10 / 4.5	12 / 4.5	--
Max Final Multiple Score	230 / 100	264 / 100	132 / 100

*PNA refers to promotion points awarded to enlistees who pass the advancement examination but were not promoted due to quota limitations.

Source: Bureau of Naval Personnel Instruction 1430.16D.

The USAF uses a compilation of performance factors to determine promotion for all of its ranks. The USAF's Weighted Airman Promotion Score (WAPS) uses factors

similar to that of the USN. Table 2.2 provides a breakdown of the USAF's promotion WAPS system.

**Table 2.2. USAF Weighted Airman Promotion Score (WAPS)
Distribution for Advancement**

Performance Measure	Maximum Points	Minimum Percentage of WAPS
Skills Classification Test	100	21.5
Promotion Fitness Exam	100	21.5
Time in Service	40	9.0
Time in Grade	60	13.0
Military Decorations	25	5.0
Enlisted Performance Record (EPR)	135	30.0

Source: AFPAM 36-2241, Vol. 1, 1 July 1997.

Unlike the USN, the USAF includes a weighted Enlisted Performance Report (EPR) as a major determinant of promotion. The weighted EPR score theoretically ranges in value from 0 through 135 and represents nearly one-third of the WAPS. The EPR is time-weighted, based on a maximum of the last five years of service, not to exceed ten reports.⁵⁵ The time-weighted factor begins with 50 for the most recent report and decreases in increments of five (50-45-40-35-etc....) for each report on file. The product is then multiplied by an EPR factor of 27. This step is repeated for each report. After calculating each report, the value of each report is summed to achieve the total weighted EPR.

The USAF--like the USN--also uses centralized boards for its senior enlisted ranks. E-7s and above are selected for promotion by an assigned board, which carefully examines the following performance factors in the selection process: scope and variety of

⁵⁵ AFPAM 36-2241 Vol. 1, 1 July 1997 p. 91

assignments; estimate of potential as reflected on evaluations; trends in efficiency, length of service and maturity; awards; military and civilian education; moral standards, integrity, and character; and general physical condition.

Differences in advancement criteria, occupational specialties, and the timing of promotions between services make it important to control for type of service in models that estimate the relationship between SES and performance. Although the USN and USAF use similar measures to gauge individual effectiveness, inherent differences in testing procedures and promotion philosophies exist between the two services. Problems that arise from these differences are exacerbated by variations in weighting methods across services as well as differences in advancement rates for Air Force Specialty Codes (AFSCs) or enlisted ratings common to both services.

Advancement rates typically differ within and between services as a result of fluctuations in the promotion “cutoff” scores established by the USN and USAF, respectively. These scores are determined by the needs or strength constraints for each AFSC/rating in both services and frequently change due to “ebbs” and “flows” in the manpower planning process. Additionally, shortages and overages are common in a number of AFSCs/ratings in which first-term attrition is difficult to predict. Although use of timing to promotion would be an ideal measure of performance to compare across services, differences in advancement rates due to changing manpower constraints would be difficult to control. Within-service comparisons may also be limited by variations in promotion “cutoff” scores between AFSCs/ratings and periodic adjustments to individual cutting scores made by each service to meet ever-changing personnel requirements.

An examination of the criteria used to determine enlisted promotions uncovers performance measures that are considered “important” to the USN and USAF. “Successful” outcomes in the areas used to compute an individual’s composite score ultimately result in promotion to the next higher rank, increased pay, and additional leadership responsibilities. Therefore, the question that remains is: what impact, if any, does SES have on first-term attrition and the determinants of promotion listed in Tables 2.1 and 2.2? Before this study attempts to examine these relationships, a brief review of past studies that linked SES to performance is necessary.

6. Linking SES to Performance

Researchers outside and within military circles have studied the effects of socioeconomic status on performance since the early 20th century. A 1981 study on *Subpopulation Differences in Performance on Tests of Mental Ability* provides a useful description of the evolution of research regarding the relationship between socioeconomic characteristics and individual performance. Research done during the two World Wars found that pre-service occupational differences accounted for significant differences in average scores on written performance tests. A study that measured the effect of father’s education on the test scores of children in the civilian sector revealed similar differences in performance. Studies in both military and civilian sectors have developed a hierarchy of average scores based on different socioeconomic indicators.⁵⁶

Servicemen generally performed better if they entered the military as professionals (accountants, lawyers, and engineers) and progressively worse if their pre-

⁵⁶ Mark J. Eitelberg, *Subpopulation Differences in Performance on Tests of Mental Ability: Historical Review and Annotated Bibliography* (Washington, DC: Office of the Secretary of Defense Directorate for Accession Policy], August 1981), pp. 17-18.

service occupations included clerical work, a skilled trade, and semi-skilled work. Service members who entered the armed forces without any previous work experience or skills obtained the lowest scores on written performance tests. In the civilian study, children performed better, on average, if their fathers held certain occupations similar to the hierarchy of skills defined by the military studies. “In general, studies that have examined social class differences--regardless of the particular scale used to measure social position or socioeconomic status--are consistent: adults and children (above two or three years of age) from more-privileged homes perform better, on average, than those from less-privileged homes.”⁵⁷

A 1995 study by Haveman and Wolfe on *The Determinants of Children's Attainments: A Review of Methods and Findings* examines many of the same variables that are used in the present study. The authors find that many aspects of SES identified in previous studies are important determinants of children's success. Socioeconomic variables, including education, health care and neighborhood quality, basic family characteristics (e.g., parental education and number of siblings), and measures of numerous aspects of the home environment--such as family structure and parental interactions--are necessary when determining subsequent effects of SES on

⁵⁷ Ibid., p. 18.

individual attainments.⁵⁸ Although Haveman and Wolfe discuss the effects of SES in terms of children's attainments, much of their methodology can be applied to this study.

The SES survey contains information on individuals who had accumulated as much as six to seven years of service as of 1996. Consequently, it is possible to examine the military careers of the survey participants over an extended period of time--beyond a first term of enlistment--and assess the possible connection between an individual's socioeconomic origins and his or her likelihood of "successful" service.

⁵⁸ Robert Haveman and Barbara Wolfe, "The Determinants of Children's Attainments: A Review of Methods and Findings," *Journal of Economic Literature*, Vol. XXXIII, December 1995, p. 1839.

III. DATA AND METHODOLOGY

A. DATA

This study draws from three sources of data: the SES survey, the DoD Military Entrance Processing Command (MEPCOM) cohort files, and performance-related data files maintained by the USN and the USAF. DMDC created an initial database by merging results from the SES survey with the MEPCOM cohort files, which, in turn, utilize Master and Loss files. Performance-related data files received from the USAF were subsequently merged at DMDC. Attempts to obtain USN performance-related data, discussed more fully below, were unsuccessful.

The SES survey data contain socioeconomic background information for military service members recruited annually from 1989 through 1995.⁵⁹ These data were collected using survey questionnaires developed by DMDC and administered each year to a sample of new recruits. The questionnaire--included as Appendix A--asked recruits to provide information about their parents' home ownership, education levels, marital status, employment status, occupations, and other socioeconomic variables.⁶⁰ The responsibility for administering survey questionnaires rests with the Basic Military Training Centers (BMTCs), where an annual sample of approximately 5,000 recruits was randomly selected from each of the USN and USAF recruit populations.

MEPCOM cohort files, maintained at DMDC, were obtained for enlisted recruits who entered the USN and USAF during 1989 through 1995. These files track the careers

⁵⁹ Years are given in fiscal years, unless otherwise stated. For example, 1989 refers to the fiscal year starting on October 1, 1988 and ending on September 30, 1989.

⁶⁰ In this study, the word "parents" collectively refers to mother, father, stepparent, or guardians, unless otherwise specified.

of active-duty enlisted personnel in a given “cohort,” where “cohort” is defined as all enlisted personnel who entered active duty in a given fiscal year. A large amount of demographic background information is available in these files as well as personnel loss actions updated through September 1995.

A third data set was created using performance measures from the USAF Personnel Master File maintained by the Air Force Personnel Center (AFPC). This file is updated as necessary through automated unit transaction files, and it is archived at AFPC. Social security numbers (SSNs) provided by DMDC were matched with those on the master file to extract the weighted EPR for use as a performance measure.

Data from the three files were matched and merged using service member SSNs. As stated previously, the database, in its current form (time series, cross-sectional, pooled data), enables researchers to conduct a longitudinal study of the SES survey respondents. SSNs and names were removed from the file after merging to protect the privacy of individuals in the sample.

B. METHODOLOGY

To examine the relationship between SES and performance in the military, this study followed several steps. The explanatory and dependent variables ultimately used in the study were identified and defined after DMDC merged the SES survey with MEPCOM cohort files and USN and USAF responses to data requests were received. A data audit of the independent variables and development of the multivariate regression models were accomplished based on the scope of performance measures received.

This section on methodology is divided into four subsections: defining explanatory variables, defining performance variables, data audit, and methods of

analyses. Several factors were considered in defining the independent and dependent variables used in the study. These include: how to categorize the variables (dichotomous, categorical, or continuous) and correlation between explanatory variables. The purpose of the data audit is to compare the SES survey samples with the total USN and USAF populations from which they are drawn. DoD-wide and civilian population data are also provided for comparative purposes. Several demographic and SES variables are examined to determine the existence of any systematic bias in the survey sample that could potentially affect the study results. Within the data audit, DoD-wide and civilian population data are also provided for comparative purposes. Linear and logit multivariate regressions were used to analyze the relationship between selected performance measures and SES. For this phase, two dependent variables were selected to act as proxies for performance. First-term attrition was used as a performance measure for both services. Weighted EPRs were used solely for the USAF.

1. Defining Explanatory Variables

This study divides the explanatory variables into three categories: SES index variables, additional information regarding demographics of the service member's parents, and service member demographics. Individual variables in each category are discussed at length in the sections below.

a. SES Index Variables

As previously noted in Chapter II of this study, an SES index typically reflects the education, income, and prestige associated with different occupations. Employing these indicators, Stevens and Cho (1985) identified an index of SES for each of the three-digit 1980 census occupation codes. Using the SES survey, DMDC

requested that military recruits identify their parents' occupations by answering questions regarding the business name, type of business, type of work, and primary duties of their mother's and father's employment. By interpreting the answers to these questions, DMDC matched parental occupations to three-digit 1980 census occupation codes, and 1990 census occupation codes in later years. Finally, each of the occupation codes was associated with a Male Socioeconomic Index (MSEI) and a Total Socioeconomic Index (TSEI) developed by Stevens and Cho.⁶¹ Furthermore, to recognize the differences associated with the distributions between male and female occupations, MSEI is used for the father's SES index and TSEI is used for the mother's SES index.⁶² The following two subsections define the SEI variables used to measure socioeconomic status in this study.

(1) **Parents' Highest SES Index (PSEI)**. This is a continuous variable based on parents' highest TSEI value. In cases where the parents never worked, or if there is uncertainty about whether the parents worked or not, or if the parents could not be matched to one of the census occupational codes, the value is set at 0.⁶³

⁶¹ Stevens and Cho developed a total of five socioeconomic indices. TSEI1 and TSEI2 were based on the total labor force, and MSEI1, MSEI2, and MSEI3 were based on a male labor force.

⁶² Socioeconomic indices for mothers and fathers are highly correlated. Therefore, to avoid problems of multicollinearity, this study uses the highest SES index of the parents present in the household when modeling the relationship between SES and performance. In this case, it also makes sense to apply a common scale to male and female occupations to limit the differences in occupational prestige scores. Socioeconomic indices for the total labor force--TSEIs--are used for both mothers and fathers. For dual-parent households, the parents' highest TSEI--TSEI2 for mothers and TSEI1 for fathers--is used. For single-parent households, TSEI2 is used if the mother is present, and TSEI1 is used if the father is present.

⁶³ In certain cases, the sole use of a specific socioeconomic index to explain the effects of SES on performance may result in a significant loss of information. Relevant information regarding a recruit's SES is ignored by omitting data that reflect differences in occupational prestige caused by 1) parents who are not present in the family, 2) parents who never worked, 3) uncertainty about whether parents worked or not, and 4) parents who could not be matched to one of the census occupational codes. This study attempts to account for these potential variations by treating each of these cases collectively in the form of a dichotomous variable in the regression analysis.

(2) **Parents' SES Index Not Valid (PSEI_NV)**. This is a dummy variable where 1 represents a service member who comes from a household where the parents never worked, the service member does not know if the parents ever worked, or the service member's parents had an occupation code that could not be matched to a valid SES index,⁶⁴ and 0 represents otherwise.

b. Parental Demographic Variables

Parental occupation alone does not adequately explain the SES backgrounds of service members. The education and income of a recruit's parents and his or her family status are also critical. Although parental education and an enlistee's family status are explicitly available in the data, parental income is not clearly defined. Therefore, parental home ownership is used as a proxy for parental income. The parental demographic variables used in this study are described below.

(1) **Parents' Highest Level of Education**. Previous studies indicate that parents who have completed high school or attended college typically have a stronger and more positive effect on their children's attainments than do parents who have not completed high school; and, further, that a mother's education is more closely related to her children's attainment than is the father's education.⁶⁵ In a single-parent household, educational level is determined by which parent is present; in a dual-parent household, the higher of the two parents' education levels is used. This study uses the highest level of parental education in a service member's household. Therefore, there are four possible categories for parents' education: No high school diploma, high school

⁶⁴ In a dual-parent household, each of these conditions must exist for both parents for the SES index to be "not valid."

⁶⁵ See Haveman and Wolfe, p. 1855.

graduate, some college, and college graduate or higher. The category high school graduate is treated as the “base” category and therefore omitted from the model. The remaining categories are defined as follows:

(a) **Parent with No High School Diploma (P_NHSD).**

This is a dummy variable where 1 represents an enlistee whose parent has no high school diploma, and 0 represents otherwise.

(b) **Parent Attended Some College (P_SCOLL).**

This is a dummy variable where 1 represents an enlistee whose parent obtained some college education but not a college degree, and 0 represents otherwise.

(c) **Parent is College Graduate or Higher (P_COLL).**

This is a dummy variable where 1 represents an enlistee whose parent obtained a college degree, and 0 represents otherwise.

(2) **Home Ownership.** Since parental income is unavailable, home ownership is used as a proxy for income and is divided into three categories: own home, rent home, and neither rent nor pay a mortgage. The category rent is treated as the “base” category and therefore omitted from the model. Previous research indicates that parental income is one of the best variables for determining the resources available to devote to children’s development; thus, the conclusion is that higher income has a positive and significant effect on children’s attainment.⁶⁶ This study assumes parents who own their home have a relatively higher income than do parents who rent or parents who pay no mortgage or no rent.

⁶⁶ Haveman and Wolfe, p. 1864.

(a) **Enlistee's Parents Own Home (OWN)**. This is a dummy variable where 1 represents an enlistee whose parents own a home, and 0 represents otherwise.

(b) **Enlistee's Parents Do Not Pay Rent or Mortgage (NOPAY)**. This is a dummy variable where 1 represents an enlistee whose parents do not pay rent or a mortgage on their home, and 0 represents otherwise.

(3) **Single-Parent Households (SPHH)**. This is a dummy variable where 1 represents enlistees who were raised in a single-parent household and 0 represents a dual-parent household. Research suggests that children who grow up in a single-parent household experience negative effects on their attainment, and that these negative effects are greater for black children than for white children.⁶⁷

c. Service Member's Demographics

Although individual AFQT scores and education have been used as indicators of performance in previous studies,⁶⁸ they are excluded in this study, which attempts to capture the total effect of SES on performance. Figure 3.1 illustrates the relationship between SES variables, an enlistee's education, AFQT score, and military performance.

Education and AFQT are output variables of SES and input variables of military performance. In other words, AFQT and education can be treated as either independent variables with respect to performance or as dependent variables in relation to SES.

⁶⁷ Ibid., p. 1871.

⁶⁸ See Horne, Cooke and Quester, Scribner et al., and Marcus and Quester.

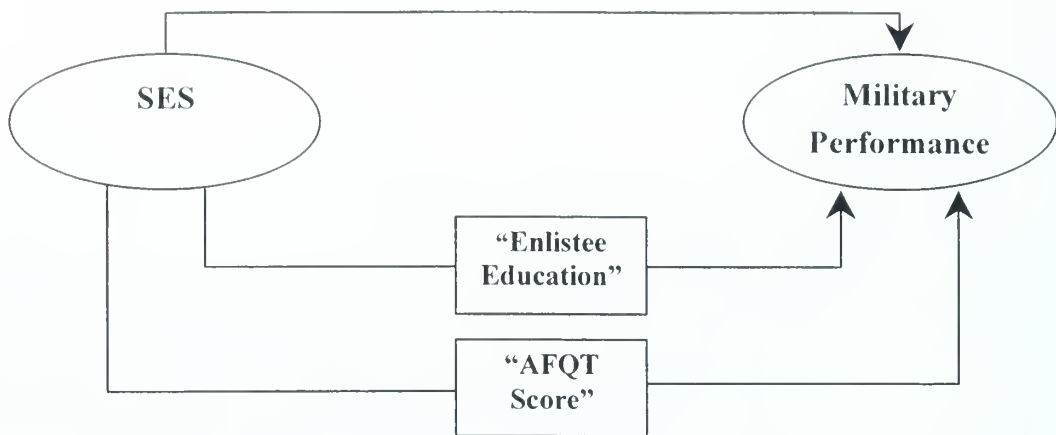


Figure 3.1. The Relationship Between SES, Enlistee’s Education, AFQT Score, and Military Performance

Therefore, a recruit’s AFQT score and education level are omitted, because including them as explanatory variables may mask the “true” relationship between SES and “unsuccessful” outcomes in the USN and USAF.⁶⁹

Gender has also been omitted as an explanatory variable. Male and female recruits are treated separately for two reasons. First, female recruits come from slightly different SES backgrounds, as a whole, than do their male counterparts--some of which may be explained by large differences in race/ethnicity. Second, the percentage of women in both services is so small that male responses dominate the regression models. In this case, male-only models are preferred. A summary of SES characteristics by gender is provided in Chapter Four. The demographic characteristics used in this study are described below:

⁶⁹ Damodar N. Gujarati, *Basic Econometrics* (New York: McGraw-Hill Book Co.), 1988, pp. 680-683.

(1) **Enlistee's Geographic Region.** Four of the five 1990 census regions are used in this study: South, Northeast, North Central, and West. Recruits from outside the continental United States were not included due to the limited number of observations in the survey sample. The category Northeast is treated as the “base” category and therefore omitted from the model. The remaining categories are defined as follows:

(a) **South (S_DIST).** This is a dummy variable where 1 represents enlistees from the Southern census region, and 0 represents enlistees from locations other than the Southern census region.

(b) **North Central (NC_DIST).** This is a dummy variable where 1 represents enlistees from the North Central region, and 0 represents enlistees from locations other than the North Central census region.

(c) **West (W_DIST).** This is a dummy variable where 1 represents enlistees from the Western census region, and 0 represents enlistees from locations other than the Western census region.

(2) **Race/Ethnicity.** The effect of minority status on attrition is unclear. For example, some research shows that blacks and Hispanics have a higher rate of attrition than do whites; at the same time, other research indicates that minority service members are less likely to leave the military early.⁷⁰ In this study, a recruit's race/ethnicity is divided into four categories: white, black, Hispanic, and other minorities. The category white is treated as the “base” category and therefore omitted from the model. The remaining categories are defined as follows:

⁷⁰ Cooke and Quester, p. 239.

(a) **Black (BLACK)**. This is a dummy variable where 1 represents a black enlistee, and 0 represents a non-black enlistee.

(b) **Hispanic (HISPAN)**. This is a dummy variable where 1 represents an Hispanic enlistee, and 0 represents a non-Hispanic enlistee.

(c) **Other Minorities (OTHMIN)**. This is a dummy variable where 1 represents an American Indian, Alaskan Native, Asian/Pacific Islander, and all other minority enlistees that are not included in Black and Hispanic categories, and 0 represents otherwise.

(3) **Enlistee's Age (AGE)**. This is a continuous variable representing an enlistee's age upon entering the USN or USAF.

Table 3.1--included below--provides a summary of the explanatory variables.

Table 3.1. Explanatory Variables and Definitions Used in the Study

Explanatory Variables	Definitions
Parents' Highest SES Index	PSEI = Continuous Variable if valid PSEI = 0 if not valid
Parents' Highest SES Index Not Valid	PSEI_NV = 1 if parents never worked, the recruit does not know if parents ever worked, or parent(s) occupation could not be matched to a valid TSEI. PSEI_NV = 0 if otherwise
Parents' Highest Level of Education	P_NHSD = 1 if no high school diploma P_NHSD = 0 if otherwise P_SCOLL = 1 if some college P_SCOLL = 0 if otherwise P_COLL = 1 if college graduate or higher P_COLL = 0 if otherwise

Table 3.1 (Continued)

Explanatory Variables	Definitions
Parental Home Ownership	OWN = 1 if parent owns home OWN = 0 if otherwise NOPAY = 1 if parent does not pay rent or mortgage NOPAY = 0 if otherwise
Single-Parent Household	SPHH = 1 if only one parent is present SPHH = 0 if both parents are present
Census Region	S_DIST = 1 if from south census region S_DIST = 0 if otherwise NC_DIST = 1 if from north central census region NC_DIST = 0 if otherwise W_DIST = 1 if from west census region W_DIST = 0 if otherwise
Service Member's Race	BLACK = 1 if black BLACK = 0 if otherwise HISPAN = 1 if Hispanic HISPAN = 0 if otherwise OTHMIN = 1 if other minority OTHMIN = 0 if otherwise
Service Member's Age	AGE = continuous variable

2. Defining Dependent Variables

Two dependent variables were used in this study as proxies for enlisted performance. Attrition was used to identify enlistees who were discharged from the USN or USAF prior to the completion of their initial term of enlistment. Data on first-term attrition⁷¹ were readily available from the Master and Loss records maintained in the MEPCOM cohort files.

⁷¹ In this study, first-term attrition is defined as the recruit's initial 48-month obligation.

In addition to information on first-term attrition contained in the MEPCOM cohort files, requests for various performance measures were sent to the USN and USAF liaisons at DMDC West. These requests--“Performance Data Wish-Lists”--have been included in this study as Appendices B and C, respectively. Both lists represent attempts to obtain information on most of the performance criteria used in the computation of USN and USAF composite scores. Receipt of subjective supervisor’s evaluations, awards, Physical Fitness Test (PFT) pass/fail indicators, and advancement examination scores would allow researchers to duplicate a significant portion of the performance scores used to determine promotion in the USN and USAF.

A series of problems were encountered in the process of retrieving performance-related data from the separate services. As it turned out, the Air Force Personnel Command (AFPC) agreed to provide only EPR scores. The remainder of the requested information was not releasable due to privacy act considerations. During the SSN merging process, DMDC matched the AFPC EPR file to the SES survey and cohort file, achieving a 90-percent match rate. Personnel who could not be matched were deleted by DMDC during the merging process.

Several problems were encountered in obtaining additional performance measures for the USN. First, an incomplete listing of USN SSNs was delivered to the Bureau of Naval Personnel (BUPERS), code P1031C4E, by DMDC. This error was not discovered before numerous attempts were made to match the BUPERS and DMDC files. These attempts were delayed for months due to tasking at BUPERS, including its relocation from Washington, D.C. to Millington, Tennessee and a database transition to the Defense Joint Military System. This relocation increased the normal work load for personnel

responsible who maintained the database system. Efforts to incorporate additional USN performance measures were subsequently abandoned as a result of the long, unplanned delay. However, efforts are continuing to obtain the USN performance data for use in later studies.

a. First-Term Attrition

First-term attrition is a useful proxy for performance in both the USN and USAF, because it is essentially measured the same in both services. Cooke and Quester used first-term attrition as one of three measures of recruit success and demonstrated that adaptability to military life is a strong indicator of a successful job-person match.⁷² In this study, three categories of first-term attrition are identified based on specific criteria--interservice separation codes (ISCs)--used to identify the purpose for discharge of enlisted personnel from the armed forces. In addition to identifying all enlisted personnel discharged during an initial term of enlistment, ISCs were used to separate recruits who were discharged based on their failure to meet minimum behavioral and performance criteria from those who failed to meet non-behavioral criteria. Each type of first-term attrition was treated as a dichotomous variable where attrition equals 1 and non-attrition equals 0.

(1) **Attrition 1 (ATT1)**. This variable represents enlistees who were discharged based on failure to meet minimum behavioral and performance criteria. These personnel were specifically identified by ISCs 60 through 87, 101, and 102. Descriptions of behavioral and performance-related ISCs are listed in Table 3.2.

⁷² See Cooke and Quester, p. 239.

Table 3.2. Interservice Separation Codes (ISCs) for Enlisted Personnel Discharged Based on Failure to Meet Minimum Behavioral or Performance Criteria

Behavioral and Performance Related ISCs	Definition
60	Character or Behavior Disorder
61	Motivational Problems (Apathy)
62	Enuresis
63	Inaptitude
64	Alcoholism
65	Discreditable Incidents
66	Shirking
67	Drugs
68	Financial Irresponsibility
69	Lack of Dependent Support
70	Civil Court Conviction
71	Civil Court Conviction
72	Security
73	Court Martial
74	Fraudulent Entry
75	AWOL, Desertion
76	Homosexuality
77	Sexual Perversion
78	Good of Service
79	Juvenile Offender
80	Misconduct
81	Unfitness (Reason Unknown)
82	Unsuitability
83	Pattern of Minor Disciplinary Infractions
83	Commission of a Serious Offense
85	ations for Retention
86	Expedition Discharge/Unsatisfactory Performance
87	Trainee Discharge/Entry Level Performance and Conduct
101	Dropped from Strength for Desertion
102	Dropped from Strength for Imprisonment

Source: Defense Manpower Data Center.

(2) **Attrition 2 (ATT2)**. This variable represents enlistees who were discharged based on non-behavioral criteria, such as medical discharges or family

hardships. These personnel were specifically identified by ISCs 10 through 22 and 90 through 99. Descriptions of non-behavioral-related ISCs are shown in Table 3.3.

Table 3.3. Interservice Separation Codes (ISCs) for Enlisted Personnel Discharged Based on Non-Behavioral Criteria

Non-Behavioral-Related ISCs	Definition
Medical Disqualifications	
10	Conditions Existing Prior to Service
11	Disability – Severance Pay
12	Permanent Disability – Retired
13	Temporary Disability – Retired
17	Disability – Non EPTS - No Severance Pay
16	Unqualified for Active Duty – Other
17	Failure to meet Weight/Body Fat Standards
Dependency or Hardship	
22	Dependency or Hardship
Other Separations or Discharges	
90	Secretarial Authority
91	Erroneous Enlistment or Induction
92	Sole Surviving Family Member
94	Marriage
94	Pregnancy
95	Underage (Minor)
96	Conscientious Objector
97	Parenthood
98	Breach of Contract
99	Other

Source: Defense Manpower Data Center.

(3) **Attrition 3 (ATT3)**. This variable represents enlistees who were discharged based on a combination of reasons related to both behavioral and non-behavioral criteria. These personnel were identified by ISCs presented in both Tables 3.2 and 3.3.

b. Other Enlisted Performance Measures

Of the performance-related data requested from both services (see Appendices B and C), usable data on USAF measures included EPR scores only. Several factors were considered in determining how to define these performance variables. First, the USAF EPR distribution is highly skewed, due to a common evaluation problem known as “grade inflation.” The mean EPR is 123.2, while the median is 135. Second, EPR scores are continuous with a theoretical range extending from 0 through 135. Finally, since there are no clear “cutoff” scores for creating a dichotomous variable, linear regression techniques are used.

(1) **Weighted Enlisted Performance Report Score (EPR).**

This is a continuous variable with a relevant range of 54 through 135.

c. Hypothesized Effects

The process of hypothesizing the effects of the various demographic and SES variables on performance is a useful prelude to the data audit and methods of analyses sections. Table 3.4 illustrates the expected relationships between the explanatory and dependent variables used in this study. For example, as parental education level increases, a recruit is less likely to leave the service prior to completion of his or her first term of enlistment and more likely to achieve higher levels of success as measured by the EPR score.

3. Data Audit

The following data audit examines demographic characteristics of non-prior service (NPS), active-duty enlisted personnel who entered the USN or USAF between 1989 and 1995. The SES survey sample used in this study contains a total of 106,232

Table 3.4. Explanatory Variables and Their Hypothesized Effects on Performance

Explanatory Variables	Hypothesized Effects On Attrition*	Hypothesized Effects on EPR*
PSEI (increase)	-	+
PSEI_NV	Uncertain	Uncertain
P_NHSD	+	-
P_SCOLL	-	+
P_COLL	-	+
OWN	-	+
NOPAY	+	-
SPHH	+	-
S_DIST	Uncertain	Uncertain
NC_DIST	Uncertain	Uncertain
W_DIST	Uncertain	Uncertain
BLACK	Uncertain	Uncertain
HISPAN	Uncertain	Uncertain
OTHMIN	Uncertain	Uncertain
AGE (increase)	+	-

* An expected positive relationship between an explanatory variable and a performance variable is denoted by a “+” sign, while a “-” sign indicates a hypothesized negative relationship. For example, as Parents’ Highest SEI (PSEI) increases, this study hypothesizes that a recruit is less likely to attrite (-) and more likely to have a “successful” outcome as measured by EPR score.

observations, including active-duty service members, reservists, and National Guard enlisted personnel from the four DoD services recruited during 1989 through 1995. After deleting Army and Marine Corps active-duty and reserve personnel, National Guard, and prior-service personnel from the USN and USAF, a total of 43,555 observations remained. Of these, the USN portion of the sample consisted of 26,460 observations, and the USAF data consisted of 22,938 observations. Tables 3.5 through 3.11 compare the demographic characteristics of the survey sample with those of the recruit populations

from which they were drawn. The demographic variables used in the comparison are gender, high school graduate status (diploma), “high-quality” status (a combination of education and aptitude test scores), and race/ethnicity. In addition, comparison measures are presented for the civilian population of 18-to 24-year-olds.

Table 3.5. Comparison of the Percent of Women* in the SES Survey Sample, Total Service Population, and Current Population Survey (CPS), Fiscal Years 1989-1995

FISCAL YEAR	USN		USAF		18-24 YR-OLDS CPS
	Survey Sample	Service Population	Survey Sample	Service Population	
1989	5.7	12.0	15.9	21.2	51.3
1990	5.7	11.3	22.6	20.4	51.0
1991	1.7	9.3	23.3	21.7	51.0
1992	5.1	14.0	17.7	21.7	50.9
1993	11.8	12.7	18.5	22.3	50.7
1994	18.8	16.8	24.4	23.8	50.4
1995	23.2	19.9	21.4	24.2	50.3

* Women in the SES survey sample and service populations include non-prior service active-duty enlisted accessions.

Source: Data on the service population and CPS are from the Department of Defense, *Population Representation in the Military Services: Fiscal Year 1995*, (Washington, DC: Office of the Assistant Secretary of Defense [Force Management Policy]), 1996.

a. Gender

Table 3.5 illustrates the proportions of female 18-to 24-year-old recruits in both the USN and USAF and provides a comparison of proportions within and across services as well as between survey samples, service populations, and the CPS.

Gender trends and distributions for the survey samples and service populations in the USN and USAF do not compare well. In the early years, women are

underrepresented in the USN sample data, while, in the last two years (1994 and 1995), they are somewhat overrepresented with respect to the service population.

The percentages of female recruits in the USAF survey sample fluctuate during 1989 and 1995, while the service population appears to increase gradually. Overall differences between the USAF sample data and service population are reasonably small, with the possible exceptions of 1989, 1992, and 1993.

The USAF has significantly greater proportions of female enlistees than does the USN. One reason for this difference is that the USAF has a greater number of occupations typically open to women than does the USN. The causes of year-by-year variations in the proportions of female recruits are unknown; and it is equally unclear what effect, if any, yearly differences between proportions of women in the sample and total population may have on the “representativeness,” by gender, of the survey sample. Nevertheless, male and female recruits will be modeled independently because of differences in SES backgrounds. For the remainder of the data audit, however, male and female recruits are combined to compare the SES survey sample data with the data for the total populations provided in the POPREP.

b. Education

Table 3.6 illustrates the proportion of 18-to 24-year-old NPS recruits who had a high school diploma in the USN and USAF as compared with the general population.⁷³

⁷³ In Table 3.6, calculations do not include enlistees with a GED or alternative credentials nor those with greater than a high school education.

Table 3.6. Comparison of the Percent of High School Diploma Graduates* in the SES Survey Sample, Total Service Population, and Current Population Survey (CPS), Fiscal Years 1989-1995

FISCAL YEAR	USN		USAF		18-24 YR-OLDS CPS
	Survey Sample	Service Population	Survey Sample	Service Population	
1989	89.6	86.9	97.9	99.0	80.1
1990	90.6	89.7	97.7	99.1	79.0
1991	92.0	93.9	97.2	98.9	79.2
1992	95.0	96.2	96.4	98.6	79.9
1993	91.5	92.2	96.6	98.7	79.9
1994	91.7	93.4	96.3	98.6	80.1
1995	92.5	92.4	97.3	98.7	79.3

* Graduates for the SES survey sample and service populations include non-prior service active-duty enlisted accessions with a high school diploma; General Educational Development (GED) and alternative credentials are not included.

Source: Data on the service population and CPS are from the Department of Defense, *Population Representation in the Military Services: Fiscal Year 1995*, (Washington, DC: Office of the Assistant Secretary of Defense [Force Management Policy]), 1996.

Comparisons of distributions between the survey samples and service populations for the USN reveal that the samples follow the same general trends as found in the service population. The USAF sample, however, consistently underrepresents (slightly) the service population with respect to high school graduates. An across-service comparison reveals that the USAF recruits a larger proportion of high school graduates than does the USN. The differences between the samples and total recruit populations are generally minor, and overall, both survey samples are considered representative of their respective populations.

c. High-Quality Recruits

Table 3.7 illustrates high-quality NPS enlistees in the USN and USAF as compared with DoD. The survey sample is generally representative of the service

populations within the USN and the USAF with slightly higher proportions in the sample data. Additionally, the USN appears to reflect the DoD average of high-quality recruits, while the USAF is significantly overrepresentative. The largest differences appear for the USN sample in 1994 and 1995, where the proportion of high-quality recruits exceeds that of the service population by at least 6 percentage points during each year.

Table 3.7. Comparison of the Percent of High Quality* Recruits in the SES Survey Sample, Total Service Population, and Department of Defense (DoD), Fiscal Years 1989-1995

FISCAL YEAR	USN		USAF		DoD
	Survey Sample	Service Population	Survey Sample	Service Population	
1989	49.2	46.8	83.0	83.0	57.1
1990	55.2	53.4	85.6	84.3	62.4
1991	61.0	59.9	85.1	84.5	68.6
1992	67.7	64.6	85.2	84.1	73.1
1993	67.4	63.0	80.0	78.7	66.4
1994	68.7	62.7	80.1	79.3	66.0
1995	65.8	59.5	84.0	82.4	65.6

* High quality recruits are defined as non-prior service active-duty enlisted accessions who are high school graduates and scored above average (at or above the 50th percentile) on the AFQT.

Source: Data on the service population and CPS are from the Department of Defense, *Population Representation in the Military Services: Fiscal Year 1995* (Washington, DC: Office of the Assistant Secretary of Defense [Force Management Policy]), 1996.

d. Race/Ethnicity

Tables 3.8 through 3.11 show the proportions of recruits by race/ethnicity in the USN and USAF survey samples and total populations. Overall, the survey samples are considered generally representative of the service populations across all racial/ethnic backgrounds, with just minor differences.

Table 3.8. Comparison of the Percent of White* 18- to 24-Year-Olds in the SES Survey Sample, Total Service Population, and Current Population Survey (CPS), Fiscal Years 1989-1995

FISCAL YEAR	USN		USAF		18-24 YR-OLDS CPS
	Survey Sample	Service Population	Survey Sample	Service Population	
1989	65.6	67.2	83.1	81.3	72.1
1990	67.3	66.7	80.1	81.6	71.9
1991	71.2	70.7	83.0	82.8	71.2
1992	70.3	69.0	82.8	82.2	70.6
1993	71.4	70.8	79.2	79.6	70.1
1994	70.6	69.9	77.2	77.2	68.7
1995	65.7	65.5	73.6	74.5	68.2

* White 18-to 24-year-olds in the SES survey sample and service populations include non-prior service, active-duty enlisted accessions.

Source: Data on the service population and CPS are from the Department of Defense, *Population Representation in the Military Services: Fiscal Year 1995* (Washington, DC: Office of the Assistant Secretary of Defense [Force Management Policy]), 1996.

Table 3.9. Comparison of the Percent of Black* 18- to 24-Year-Olds in the SES Survey Sample, Total Service Population, and Current Population Survey (CPS), Fiscal Years 1989-1995

FISCAL YEAR	USN		USAF		18-24 YR-OLDS CPS
	Survey Sample	Service Population	Survey Sample	Service Population	
1989	22.5	21.4	10.6	12.7	13.7
1990	20.6	20.7	13.1	12.7	13.9
1991	15.7	16.0	9.9	10.8	14.1
1992	15.4	16.8	10.4	11.1	14.2

Table 3.9 (Continued)

FISCAL YEAR	USN		USAF		18-24 YR-OLDS CPS
	Survey Sample	Service Population	Survey Sample	Service Population	
1993	16.5	16.8	13.1	12.7	14.3
1994	17.5	18.2	14.3	14.1	14.2
1995	19.4	19.6	15.0	14.5	14.3

* Black 18-to 24-year-olds in the SES survey sample and service populations include non-prior service, active-duty enlisted accessions.

Source: Data on the service population and CPS are from the Department of Defense, *Population Representation in the Military Services: Fiscal Year 1995* (Washington, DC: Office of the Assistant Secretary of Defense [Force Management Policy]), 1996.

Table 3.10. Comparison of the Percent of Hispanic* 18- to 24-Year-Olds in the SES Survey Sample, Total Service Population, and Current Population Survey (CPS), Fiscal Years 1989-1995

FISCAL YEAR	USN		USAF		18-24 YR-OLDS CPS
	Survey Sample	Service Population	Survey Sample	Service Population	
1989	8.7	7.9	3.5	3.4	10.7
1990	8.8	9.1	3.5	3.4	10.8
1991	9.8	9.7	3.7	3.6	11.1
1992	10.3	10.6	3.7	3.7	11.3
1993	8.7	9.0	4.2	4.3	11.5
1994	8.0	7.9	4.8	4.9	13.0
1995	10.1	10.1	6.1	6.2	13.9

* Hispanic 18-to 24-year-olds in the SES survey sample and service populations include non-prior service, active-duty enlisted accessions.

Source: Data on the service population and CPS are from the Department of Defense, *Population Representation in the Military Services: Fiscal Year 1995* (Washington, DC: Office of the Assistant Secretary of Defense [Force Management Policy]), 1996.

Table 3.11. Comparison of the Percent of Other Minority* 18- to 24-Year-Olds in the SES Survey Sample, Total Service Population, and Current Population Survey (CPS), Fiscal Years 1989-1995

FISCAL YEAR	USN		USAF		18-24 YR-OLDS CPS
	Survey Sample	Service Population	Survey Sample	Service Population	
1989	3.2	3.6	2.9	2.6	3.5
1990	3.3	3.5	2.6	2.3	3.4
1991	3.2	3.6	3.4	2.9	3.7
1991	4.0	3.6	3.1	2.9	3.9
1993	3.3	3.4	3.5	3.4	4.0
1994	3.9	4.0	3.8	3.9	4.1
1995	4.9	4.9	5.2	4.8	3.6

* Other Minority 18-to 24-year-olds in the SES survey sample and service populations include non-prior service, active-duty enlisted accessions.

Source: Data on the service population and CPS are from the Department of Defense, *Population Representation in the Military Services: Fiscal Year 1995* (Washington, DC: Office of the Assistant Secretary of Defense [Force Management Policy]), 1996.

Since the SES survey was administered randomly to recruits from the USN and USAF, and the survey sample is a random selection of the service populations, there is no reason to believe that systematic biases exist between the survey samples and service populations. Some of the observed differences are likely due to the timing of the survey, especially with respect to gender and “high-quality.” It is known, for example, that minor variations in the education level of recruits may occur during different periods of the year, based on high school cycles. Further, the accession of female recruits may be regulated to a greater extent than that of their male counterparts due to limitations on the availability of school seats. This may have been particularly true in the earlier years of the USN sample. Nevertheless, Tables 3.5 through 3.11 indicate that the SES survey sample is generally representative of the total service population from which it is drawn.

4. Methods of Analyses

Two methods of multivariate data analysis are used to quantify the relationship between SES and performance in the USN and USAF. Ordinary Least Squares (OLS) regression analysis is used for the dependent variables that are continuous, such as the USAF EPR and Logistic (Logit) regression analysis is used for binary choice dependent variables, such as attrition. Descriptions of OLS and Logit are included in the following two subsections.

a. Ordinary Least Squares (OLS) Regression Analysis

OLS is the most extensively used method of constructing the sample regression function in multivariate regression analysis for several reasons. First, the method of least squares chooses parameter estimates while minimizing the error term. Second, OLS estimators are easily computed, because they are expressed solely in terms of the observable (sample) quantities of the explanatory (X) and dependent (Y) variables. Third, once the OLS estimates are obtained from the sample data, the sample regression line can be easily obtained as it passes through the sample means of X and Y. And, finally, the linear relationship that exists in OLS models simplifies the interpretation of the parameter estimates. For example, a one-unit change in X results in a (one parameter estimate) unit change in Y.⁷⁴

This study uses the method of ordinary least squares to quantify the relationship between a set of explanatory variables and EPR, a continuous dependent variable. Variables used in the OLS model are explained below in Table 3.12.

⁷⁴ Gujarati, pp. 52-80.

Table 3.12. Ordinary Least Squares Regression Model for USAF EPR Scores

EPR = f (PSEI PSEI_NV P_NHSD P_SCROLL P_COLL OWN NOPAY SPHH
S_DIST NC_DIST W_DIST BLACK HISPAN OTHMIN AGE)

b. Logistic (Logit) Regression Analysis

In cases where a clear division can be made between successful performance and lower levels of performance or failure, such as first-term attrition, linear probability, probit, and logit models can be used. While all of these techniques are appropriate when estimating the relationship between a set of explanatory variables and a dichotomous dependent variable, this study uses the logit model.

Therefore, the model of the relationship between the explanatory variables and first-term attrition is based on the cumulative logistic distribution function:⁷⁵

$$P_i = \frac{1}{(1 + e^{-(\sum \beta_i X_i)})}$$

where P_i = the probability of successful performance

X_i = a row vector of service member SES and cohort specific characteristics

β_i = a column vector of parameters to be estimated

The logit model was selected over alternative methods such as the linear probability model or the probit model for several reasons. First, unlike the linear

⁷⁵ Ibid., pp. 452-475.

probability model, the logit model restricts the probabilities to lie between zero and one while the logit itself remains unbounded. That is,

$$P_i \rightarrow 0 \text{ when } \beta_i X_i \rightarrow -\infty \text{ and } P_i \rightarrow 1 \text{ when } \beta_i X_i \rightarrow +\infty$$

Second, although the logit is linear in X_i , the probabilities themselves are not. This differs from the linear probability model where the probabilities increase linearly with X .⁷⁶ The logit model is used, because it is reasonable to assume that the values of the explanatory variables increase or decrease indefinitely.

Logit was selected over probit primarily because it is generally less computationally involved. Maximum Likelihood Estimation (MLE) is used to estimate model coefficients. The following logit models were used to estimate the effects of SES and service member characteristics on performance. Variables used in each model are explained in Table 3.13.

c. Validating the Models

To validate the performance models defined in the previous two sections, this study analyzed the relationship between SES and AFQT scores. The results of this model--included as Appendix D--illustrate the usefulness of each of the SES variables. In other words, the explanatory variables defined in this study can be considered strong measures of performance, because the expected effects of SES on AFQT were confirmed and were consistent for both USN and USAF. With the exception of region, each of the SES variables had a significant effect on AFQT scores. In the next chapter, this study

⁷⁶ Ibid.

Table 3.13. Logistic Multivariate Regression for USN and USAF First-Term Attrition Models

Behavioral and Performance-Related Attrition (Attrition 1):
ATT1 = f (PSEI PSEI_NV P_NHSD P_SCROLL P_COLL OWN NOPAY SPHH S_DIST NC_DIST W_DIST BLACK HISPAN OTHMIN AGE)
Non-Behavioral Attrition (Attrition 2):
ATT2 = f (PSEI PSEI_NV P_NHSD P_SCROLL P_COLL OWN NOPAY SPHH S_DIST NC_DIST W_DIST BLACK HISPAN OTHMIN AGE)
Overall First-Term Attrition (Attrition 3):
ATT3 = f (PSEI PSEI_NV P_NHSD P_SCROLL P_COLL OWN NOPAY SPHH S_DIST NC_DIST W_DIST BLACK HISPAN OTHMIN AGE)

examines the results of logit and linear models defined for first-term attrition and EPR scores. Based on the results presented in Appendix D, the authors expect to find significant effects on the variables used to measure performance used in this study.

IV. STATISTICAL ANALYSIS AND RESULTS

A. INTRODUCTION

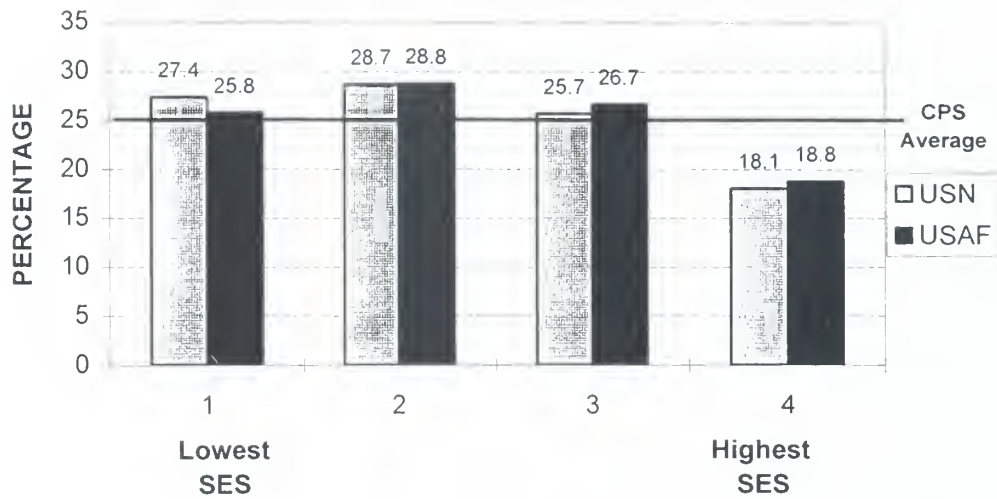
This chapter provides results of cross tabulation and multivariate regression analyses. Several procedures are used to determine the socioeconomic backgrounds of recruits, overall population representation of the armed forces, and the relationship between SES and military performance. First, USN and USAF recruit SES background characteristics are compared with CPS data for the 18-to 24-year-old civilian population. These characteristics include parents' occupation, education, and home ownership. Simple cross tabulations are used to examine significant differences that exist between enlistees' SES and that of the civilian population for all three of these variables. Second, several factors are considered that may explain these differences. Such factors include the following: family status, race/ethnicity, census region, gender, reasons for joining the military, and the omission of officers from the military data. The final section of the chapter summarizes the results of the OLS and logit regression models used to analyze the relationship between SES and performance. The analysis looks at both parameter estimates and marginal effects and provides a detailed comparison of three "typical" recruits in the USN and USAF.

B. SES REPRESENTATION

On average, recruits in both services come from slightly lower SES backgrounds than found in the general population. These differences are best explained by comparing mean levels of MSEI (fathers) and TSEI (mothers) for sailors and airmen with those of the CPS. SES indices are good indicators of overall SES representation in the USN and

USAF, because they reflect parents' average levels of education, income, and prestige within occupations. Figures 4.1 and 4.2 compare SES indices for fathers and mothers of USN and USAF active-duty enlisted accessions with those of a comparable population in the CPS. The quartiles divide CPS parents into equal fourths with respect to SES; and USN and USAF recruit parents' are then distributed among these quartiles. The results, as seen in Figure 4.1, show that fathers of enlistees are considerably underrepresented in the highest SES quartile, almost represented in the "upper-middle" quartile (3rd quartile), and generally overrepresented in the lower two SES quartiles, when compared with 18-to-24-year-old civilians. The results for mothers of enlistees (Figure 4.2) are somewhat different from the findings regarding fathers. Here, mothers are similarly underrepresented in the highest SES quartile and slightly overrepresented in the lowest quartile; but mothers are also nearly represented in the "lower-middle" quartile (2nd quartile), and overrepresented in the "upper-middle" quartile (3rd quartile). Thus, the trend for mothers in the middle two quartiles is the converse of that for fathers, with a greater concentration of the upper end of the SES range.

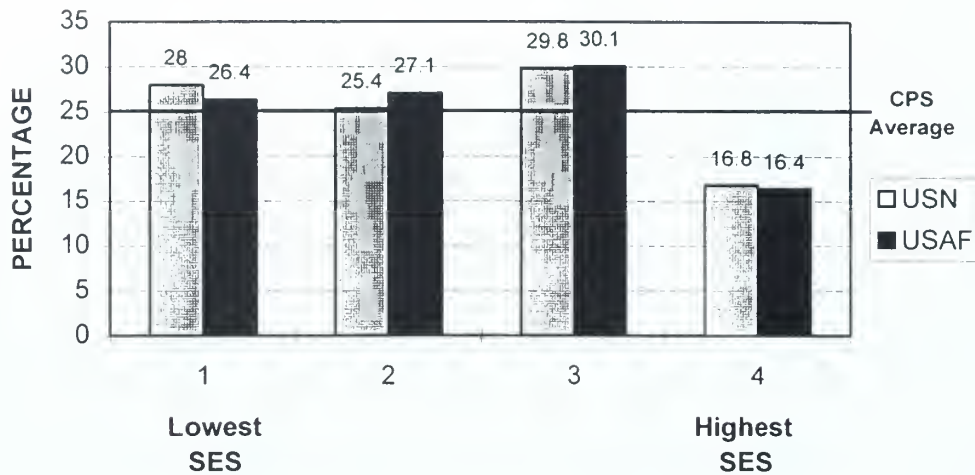
Recruits versus CPS Fathers: A Comparison by MSEI Quartiles



Source: Derived from data provided by the Defense Manpower Data Center.

Figure 4.1. Comparison of Male Socioeconomic Indices (MSEIs) for Fathers of USN and USAF Active-Duty, Non-Prior Service, Enlisted Accessions with 18- to 24-Year-Olds from the 1995 Current Population Survey (CPS)

Recruits versus CPS Mothers: A Comparison by TSEI Quartiles



Source: Derived from data provided by the Defense Manpower Data Center.

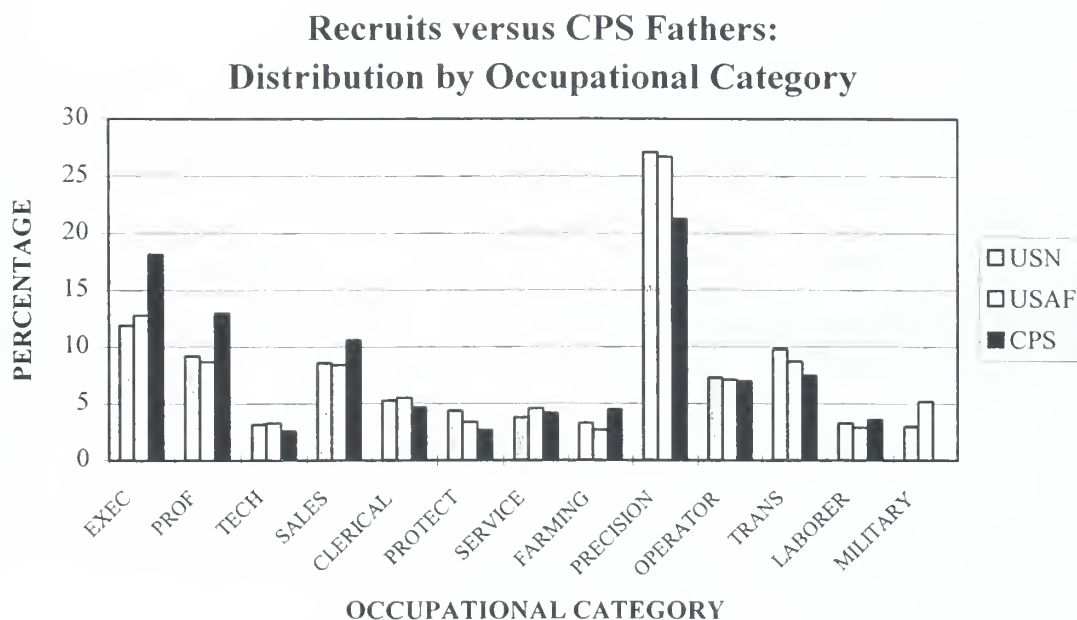
Figure 4.2. Comparison of Total Socioeconomic Indices (TSEIs) for Mothers of USN and USAF Non-Prior Service, Active-Duty, Enlisted Accessions with 18- to 24-Year-Olds from the 1995 Current Population Survey (CPS)

Socioeconomic indices are good overall indicators of SES representation, because they combine several important variables, such as the education, income, and prestige levels of occupations. It is also useful to examine each of these variables individually. In the next three subsections, this study identifies differences between the SES survey population and the CPS sample with respect to parents' occupational categories, education levels, and home ownership. Previous research is used as a guide in examining these differences.⁷⁷

⁷⁷ Cooper (1977), Fredland and Little (1982), Fernandez (1989), and DoD's annual POPREP (1995) all find that military recruits come from slightly lower SES backgrounds than found in the general population.

1. Parents' Occupation

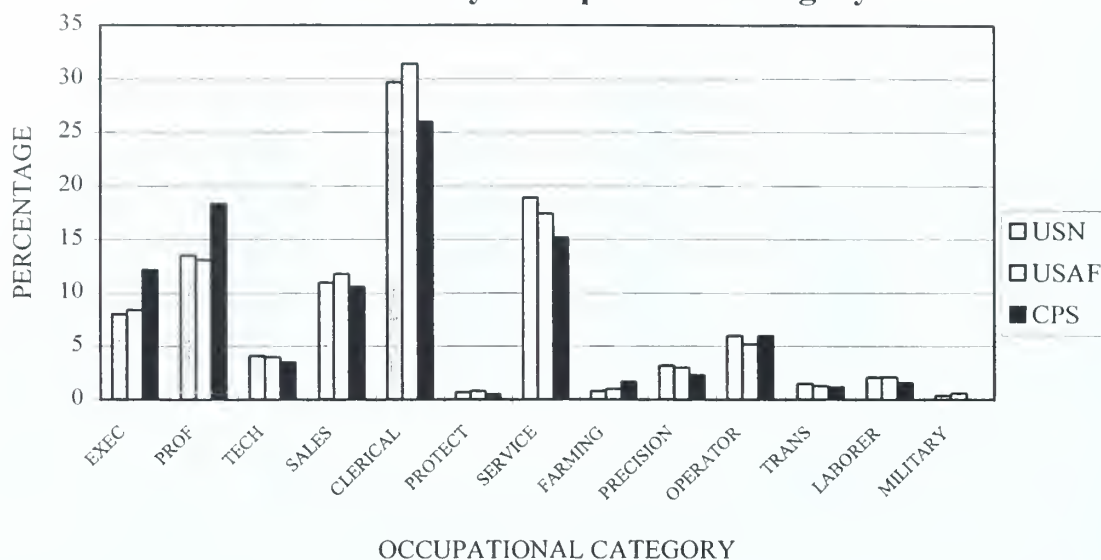
Figures 4.3 and 4.4 compare the distribution of parents' occupational categories for USN, USAF, and CPS groups. Consistent with the disparities in quartile distributions for MSEI and TSEI, USN and USAF parents tend to be underrepresented in certain high-prestige occupational areas. For example, the percentages of USN and USAF parents who are employed as executives and professionals are noticeably lower than those of CPS parents. Conversely, USN and USAF parents are somewhat overrepresented in occupational categories that are typically classified as "blue collar," such as clerical, service, and technician; and these differences are most visible for USN and USAF fathers in precision, and for USN and USAF mothers in clerical and service occupations.



Source: Derived from data provided by the Defense Manpower Data Center.

Figure 4.3. Percentage Distributions by Occupational Category for Fathers of USN and USAF Recruits and 18- to 24-Year-Olds from the 1995 Current Population Survey (CPS)

Recruits versus CPS Mothers: Distribution by Occupational Category



Source: Derived from data provided by the Defense Manpower Data Center.

Figure 4.4. Percentage Distributions of Occupational Category for Mothers of USN and USAF Recruits and 18- to 24-Year-Olds from the 1995 Current Population Survey (CPS)

Table 4.1 compares the mean values for each of the socioeconomic indicators used in this study, which include: MSEI, TSEI, father's and mother's education, and parental home ownership. As shown in the table, the relative size of the standard error for each of these variables is relatively large. Therefore, each of the recruits' parental socioeconomic indicators are statistically insignificant when compared with the CPS. However, the trend clearly suggests that recruits in both services are from a somewhat lower socioeconomic background than found in the CPS.

Table 4.1. Comparison of Mean Socioeconomic Indices (MSEIs and TSEIs)^a, Parental Education, and Parental Home Ownership for Fathers and Mothers of USN and USAF Recruits^b with 18- to 24-Year-Olds from the 1995 Current Population Survey (CPS)

SES Variables	USN	USAF	CPS
MSEI (standard error)	36.53 (18.69)	37.07 (18.46)	40.23 (21.04)
TSEI (standard error)	34.67 (15.42)	34.78 (15.22)	38.05 (18.16)
Father's Education^c (standard error)	2.48 (1.02)	2.55 (0.99)	2.65 (1.03)
Mother's Education^c (standard error)	2.41 (0.96)	2.42 (0.92)	2.51 (0.97)
Home Ownership^d (standard error)	1.33 (0.55)	1.30 (0.55)	1.24 (0.46)

^a MSEI represents the Male Socioeconomic Index, and TSEI represents the Total Socioeconomic Index. TSEI, by convention, is used to explain mother's socioeconomic background.

^b Includes non-prior service, active-duty enlisted accessions from 1989 through 1995.

^c For cross-tabulation analysis, parental education levels are assigned the following values: (1) for non-high school graduates, (2) for high school graduates, (3) for some college, and (4) for college graduates. Then a simple average is computed.

^d For cross-tabulation analysis, home ownership is assigned the following values: (1) for parents who own homes, (2) for parents who rent homes, and (3) for parents who pay neither rent nor mortgage. A mean value that approaches "one" indicates that the parent is more likely to own a home. Since these values approximate the family's income, this study assumes that parents who own a home have the highest levels of income. Then a simple average is computed.

Source: Derived from data provided by the Defense Manpower Data Center.

2. Parents' Education

As previously noted, this study uses four levels of parental education: non-high school graduate, high school graduate, attended some college, and college graduate. Table 4.1 shows that parents of USN and USAF recruits have generally lower average levels of education than do CPS parents. For example, as seen here, USN and USAF

fathers have average education levels of 2.48 and 2.55, respectively, versus 2.65 for CPS fathers.

Table 4.2 compares the percentage distribution of education levels for USN, USAF, and CPS mothers and fathers. For example, 19.2 percent and 15.6 percent of USN and USAF fathers, respectively, are non-high school graduates compared with 14.9 percent of CPS fathers. The results in Table 4.2 indicate that differences in the mean values are influenced by differences in the lowest and highest categories of education. In other words, parents of USN and USAF recruits are more likely than CPS parents to be non-high school graduates, and they are less likely to be college graduates.

Table 4.2. Percentage Distribution by Education Levels for Fathers and Mothers of USN and USAF Recruits* and 18- to 24-Year-Olds in the 1995 Current Population Survey (CPS)

EDUCATION LEVEL	FATHERS		
	USN	USAF	CPS
Non High School Graduate	19.2	15.6	14.9
High School Graduate	34.1	34.8	32.4
Some College	25.8	28.7	25.4
College Graduate	20.9	20.9	27.3
Total	100.0	100.0	100.0
	MOTHERS		
Non High School Graduate	17.9	15.5	15.4
High School Graduate	38.9	41.3	37.3
Some College	27.1	28.7	27.9
College Graduate	16.1	14.5	19.4
Total	100.0	100.0	100.0

* Includes non-prior service, active-duty enlisted accessions from 1989 to 1995.

Source: Derived from data provided by the Defense Manpower Data Center.

3. Parents' Home Ownership

Home ownership is used as a proxy for parental income in this study. Mean values in Table 4.1 indicate that parents of USN and USAF recruits are less likely to own a home than are CPS parents and more likely to “pay neither rent nor mortgage.” As such, recruits’ parents in both services are assumed to have lower average incomes than do their civilian counterparts. Table 4.3 shows the percentage distributions of home ownership variables for USN, USAF, and CPS parents. For instance, approximately 80 percent of USN and USAF recruit fathers own their homes, compared with nearly 83 percent of CPS fathers. Similar to the distributions of parents’ occupational categories and education levels, recruits’ parents are slightly underrepresented as home owners in the highest category and overrepresented among those who pay neither rent nor mortgage.

Table 4.3. Percentage Distributions by Home Ownership for Fathers and Mothers of USN and USAF Recruits* and 18- to 24-Year-Olds in the 1995 Current Population Survey (CPS)

HOME OWNERSHIP	FATHERS		
	USN	USAF	CPS
Own	78.2	80.2	82.7
Rent	17.7	15.3	16.1
Occupied/No Rent	4.1	4.5	1.2
Total	100.0	100.0	100.0
	MOTHERS		
	USN	USAF	CPS
Own	72.0	75.5	75.4
Rent	23.8	20.1	23.3
Occupied/No Rent	4.2	4.4	1.3
Total	100.0	100.0	100.0

* Includes non-prior service, active-duty enlisted accessions from 1989 to 1995.

Source: Derived from data provided by the Defense Manpower Data Center.

This study reveals a noteworthy trend in differences between the SES background characteristics of USN and USAF recruits and the CPS sample. The USN and USAF recruits have lower mean values for all of the SES variables, reflected in consistent differences between the distributions of both samples by SES-related characteristics. Parents of recruits in both services are underrepresented in the “highest” categories of occupation, education, and home ownership and overrepresented in the “lowest” categories. For example, parents of USN and USAF recruits are *more* likely than their CPS counterparts to be non-high school graduates, work in clerical or service occupations, and neither rent nor own their homes; and they are *less* likely than CPS parents to be college graduates, work as professionals or executives, and own their homes.

4. Family Status

Family status is divided into single-parent and dual-parent households. Table 4.4 compares the family background of USN and USAF recruits with that of 18-to 24-year-olds from the CPS. For instance, as seen here, almost twice as many recruit families in the USN and USAF are headed by single mothers, as compared with CPS families; and, as a whole, recruits in both services are less likely than their civilian counterparts to come from dual-parent households. This may account for some of the variation in SES background between the survey sample and the CPS, since mothers generally have lower levels of occupational prestige and education than fathers. Additionally, single-parent household denotes lower SES due to loss of parents’ income and time at home.

Table 4.4. Percentage Distribution by Family Status for USN and USAF Recruits* and 18- to 24-Year-Olds in the 1995 Current Population Survey (CPS)

FAMILY STATUS	USN	USAF	CPS
Dual-Parent Household	70.2	74.9	84.5
Single-Parent Household (Mother)	23.0	19.5	12.1
Single-Parent Household (Father)	6.8	5.6	3.4
Total	100.0	100.0	100.0

* Includes non-prior service, active-duty enlisted accessions from 1989 to 1995.

Source: Derived from data provided by the Defense Manpower Data Center.

In the following section, several factors are examined that may explain why USN and USAF recruits come from slightly lower SES backgrounds than do their civilian counterparts.

C. EXPLAINING DIFFERENCES IN SES REPRESENTATION

Several factors may help to explain differences between the SES background of recruits and that of their CPS counterparts to include: race/ethnicity, region, gender, the omission of officers from the military data, and recruit's reasons for joining the military. Each of these factors is addressed below:

1. Race/Ethnicity

This section examines whether observed differences in SES backgrounds are linked to the overrepresentation of blacks in the military services. The findings reveal that, although black enlistees come from a lower SES background than do their white counterparts, only small differences exist between the SES background of black enlistees and that of their CPS counterparts.

Race/ethnicity is divided into white, black, Hispanic, and other minorities to compare USN and USAF data with the CPS. Table 4.5 shows the distribution of race/ethnicity in the USN, USAF, and general population. For example, 18.5 percent and 12.9 percent of USN and USAF recruits, respectively, are black, compared with 11.5 percent of the 18-to 24-year-olds from the CPS. As compared with the CPS, the USN has proportionately fewer white enlistees and proportionately more black and Hispanic enlistees. This does not hold true for the USAF, which has a slightly higher percentage of white and black enlistees and a smaller proportion of Hispanic enlistees.

Table 4.5. Percentage Distribution by Race/Ethnicity for USN and USAF Recruits* and 18- to 24-Year-Olds in the 1995 Current Population Survey (CPS)

RACE/ ETHNICITY	USN	USAF	CPS
White	68.4	79.1	76.3
Black	18.5	12.9	11.5
Hispanic	9.2	4.3	8.0
Other Minorities	3.9	3.7	4.2
Total	100.0	100.0	100.0

* Includes non-prior service, active-duty enlisted accessions from 1989 to 1995.

Source: Derived from data provided by the Defense Manpower Data Center.

Tables 4.6 and 4.7 compare the mean SES Index for each racial/ethnic group for both USN and USAF samples with its CPS counterpart. These tables help to explain some of the difference between the parental SES of USN and USAF recruits and that of the CPS. From these tables, two major findings emerge. First, the USN and USAF generally recruit younger people from a socioeconomic level that is below the average for the general population. Of the differences between the overall service and CPS means,

most of the variation is explained by the differences between white enlistees for the service sample and their counterparts in the CPS. A much smaller portion of the variation is explained by differences in the other minority category, whose members comprise a relatively small percentage of the service and civilian populations. Second, the comparative difference between black recruits from both services and their counterparts in the civilian population appears minimal and does not explain the overall mean SES indices.

One particularly interesting finding here is that the military appears to recruit Hispanics from a higher SES level than that of their civilian counterparts. Hispanics comprise a relatively small proportion of USN and USAF recruits (about 9 percent and 4 percent, respectively, from Table 4.5); but this particular trend generally runs counter to other military-civilian relationships found in this analysis.

Table 4.6. Comparison of Mean Male Socioeconomic Indices (MSEIs), by Race/Ethnicity, for Fathers of USN and USAF Recruits^a with 18- to 24-Year-Olds from the 1995 Current Population Survey (CPS)

	OVERALL MEAN	WHITE	BLACK	HISPANIC	OTHER
USN	36.53	37.58	31.53	33.55	37.19
CPS	40.23	42.96	32.59	28.41	43.05
Δ^b	-3.70	-5.38	-1.06	+5.14	-5.86
USAF	37.07	37.48	33.05	35.82	38.51
CPS	40.23	42.96	32.59	28.41	43.05
Δ^b	-3.16	-5.48	+0.46	+7.41	-4.54

^a Includes non-prior service, active-duty enlisted accessions from 1989 to 1995.

^b Delta (Δ) represents the difference between the mean MSEI for each service and CPS data. A negative (-) indicates the service mean is smaller than the CPS mean, while a positive (+) indicates that the service mean is greater than the CPS mean.

Source: Derived from data provided by the Defense Manpower Data Center.

Table 4.7. Comparison of Mean Total Socioeconomic Indices (TSEIs), by Race/Ethnicity, for Mothers of USN and USAF Recruits^a with 18- to 24-Year-Olds from the 1995 Current Population Survey (CPS)

	OVERALL MEAN	WHITE	BLACK	HISPANIC	OTHER
USN	34.67	35.44	32.82	32.13	33.67
CPS	38.05	40.05	33.55	30.89	36.39
Δ^b	-3.38	-4.61	-.73	+1.84	-2.71
USAF	34.78	35.12	33.44	33.28	32.84
CPS	38.05	40.05	33.55	30.29	36.38
Δ^b	-3.27	-4.93	-.11	+2.99	-3.54

^a Includes non-prior service, active-duty enlisted accessions from 1989 to 1995.

^b Delta (Δ) represents the difference between the mean MSEI for each service and CPS data. A negative (-) indicates the service mean is smaller than the CPS mean, while a positive (+) indicates that the service mean is greater than the CPS mean.

Source: Derived from data provided by the Defense Manpower Data Center.

2. Region

Persons from the Southern regions of the U.S. generally have lower measures of SES than do those from other regions.⁷⁸ This section examines whether patterns in the regional representation of recruits may affect observed differences in SES between the USN and USAF and the CPS sample.

Region is divided into four census groups: Northeast, North Central, South, and West. Table 4.8 shows the percentage distribution by census regions of USN and USAF recruits and 18-to 24-year-olds in the 1995 CPS. As seen here, both services recruit a

⁷⁸ U.S. Bureau of the Census, *Statistical Abstract of the United States: 1990 (110th edition.)* Washington, DC, 1990.

disproportionately large number of enlistees from the Southern census region--just over 40 percent in the USN and USAF, compared with 30 percent in the CPS.

Table 4.8. Percentage Distribution, by Census Region, of USN and USAF Recruits* and 18- to 24-Year-Olds in the 1995 Current Population Survey (CPS)

REGION	USN	USAF	CPS
Northeast	14.3	16.6	23.7
North Central	24.2	24.2	25.1
South	40.9	40.4	30.1
West	20.6	18.8	21.1
Total	100.0	100.0	100.0

* Includes non-prior service, active-duty enlisted accessions from 1989 to 1995.

Source: Derived from data provided by the Defense Manpower Data Center.

Table 4.9 compares the mean SES indices by census region for USN and USAF recruits with those of the general population. Two trends are evident: first, both the USN and USAF generally recruit lower SES personnel from all census regions; and, second, within the services, recruits from the Northeast, North Central, and Southern regions have lower SES indices than their respective service means. These three regions account for approximately 80 percent of recruits in the USN and USAF. Both of these findings may help to explain some of the differences in the SES indices between the military and the civilian populations.

3. Gender

This section examines whether female recruits have lower measures of SES than do male recruits. Table 4.10 compares the mean SES indices of male and female recruits with those of 18-to 24-year-olds from the 1995 CPS, along with comparative measures of father's education, mother's education, and home ownership.

Table 4.9. Comparison of Mean Socioeconomic Indices (MSEIs and TSEIs)^a, by Census Region, for USN and USAF Recruits^b with 18- to 24-Year-Olds from the 1995 Current Population Survey (CPS)

REGION	MSEI			TSEI		
	USN	USAF	CPS	USN	USAF	CPS
Northeast	36.36	36.00	42.04	34.18	34.26	38.98
North Central	35.46	35.28	39.63	34.51	34.12	37.82
South	36.43	37.66	39.71	34.43	34.85	37.61
West	37.89	39.13	39.72	35.53	35.92	37.97
Service and CPS Mean SES Index	36.66	37.33	40.23	34.75	35.02	38.06

^a MSEI represents the Male Socioeconomic Index, and TSEI represents the Total Socioeconomic Index. TSEI, by convention, is used to explain mother's socioeconomic background.

^b Includes non-prior service, active-duty enlisted accessions from 1989 through 1995.

Source: Derived from data provided by the Defense Manpower Data Center.

The findings reveal that female USN and USAF recruits generally come from lower SES backgrounds than do their male and CPS counterparts. However, the differences between the SES backgrounds of male and female recruits do not explain the overall differences between the military and civilian samples with respect to SES for several reasons. First, the proportion of women in both services is relatively small--about 11 percent and 18 percent in the USN and USAF, respectively. Second, as seen in Table 4.10, the standard errors are much larger than the mean differences in SES characteristics between male and female recruits for both services and their counterparts from the CPS. And, finally, the military sample appears to be relatively homogeneous regardless of gender. Thus, the data, as seen here, support previous findings, but do not explain differences in SES representation.

Table 4.10. Comparison of Mean Socioeconomic Indices (MSEIs and TSEIs)^a, Parental Education, and Parental Home Ownership, by Gender, for USN and USAF Recruits^b with 18- to 24-Year-Olds from the Current Population Survey (CPS)

SES Characteristics	USN		USAF		CPS MEAN
	Male	Female	Male	Female	
MSEI (standard error)	36.66 (18.69)	35.34 (18.65)	37.33 (18.44)	36.01 (18.47)	40.23 (21.04)
TSEI (standard error)	34.74 (15.39)	34.10 (15.66)	35.02 (15.22)	34.00 (15.17)	38.05 (18.16)
Father's Education (standard error)	2.49 (1.03)	2.44 (1.02)	2.56 (0.98)	2.51 (1.01)	2.65 (1.03)
Mother's Education (standard error)	2.42 (0.96)	2.36 (0.97)	2.44 (0.92)	2.37 (0.93)	2.51 (0.97)
Home Ownership (standard error)	1.32 (0.55)	1.35 (0.55)	1.29 (0.54)	1.33 (0.56)	1.24 (0.46)

^a MSEI represents the Male Socioeconomic Index, and TSEI represents the Total Socioeconomic Index. TSEI, by convention, is used to explain mother's socioeconomic background.

^b Includes non-prior service, active-duty enlisted accessions from 1989 through 1995.

Source: Derived from data provided by the Defense Manpower Data Center.

4. Omission of Officers

It is assumed that military officers, who are almost entirely college graduates, come from families with a "higher" level of parental education, on average, than do enlisted accessions.⁷⁹ This section examines whether the inclusion of officers in the SES survey database would eliminate differences between the military population and the CPS samples.

In an effort to determine the accuracy of the hypothesis stated above, a simple quantitative approach is used to account for differences based on the omission of officers

⁷⁹ See *Population Representation in the Military Services*, FY 1995.

in the service sample. Table 4.11 shows the calculations involved in determining the effects of adding officers to the USN and USAF samples.

Table 4.11. Computation for the Ratio of Socioeconomic Indices (MSEIs and TSEIs)* for USN and USAF Enlistees and Officers to 18- to 24-Year-Olds from the 1995 Current Population Survey (CPS)

USN =	$\frac{(\alpha_E)MSEI_E + (\alpha_O)MSEI_O}{MSEI_C} = \frac{(.93)(36.53) + (.07)(49.06)}{40.23} = 0.930$
USN =	$\frac{(\alpha_E)TSEI_E + (\alpha_O)TSEI_O}{TSEI_C} = \frac{(.93)(34.67) + (.07)(46.93)}{38.05} = 0.934$
USAF =	$\frac{(\alpha_E)MSEI_E + (\alpha_O)MSEI_O}{MSEI_C} = \frac{(.86)(37.07) + (.14)(49.06)}{40.23} = 0.963$
USAF =	$\frac{(\alpha_E)TSEI_E + (\alpha_O)TSEI_O}{TSEI_C} = \frac{(.86)(34.78) + (.14)(46.93)}{38.05} = 0.959$

* MSEI represents the Male Socioeconomic Index, and TSEI represents the Total Socioeconomic Index. TSEI, by convention, is used to explain mother's socioeconomic background.

Source: Derived from data provided by the Defense Manpower Data Center.

Table 4.11 uses a ratio composed of enlistee and officer mean SES indices over the civilian population mean SES index to estimate the effects of including officers in the sample. As seen in the equations, α_E and α_O represent the proportion of enlistees and officers, respectively, for each of the services. $MSEI_E$ and $TSEI_E$ represent the mean indices for fathers and mothers of enlisted military members. $MSEI_C$ and $TSEI_C$ represent the mean SES indices for fathers and mothers of the civilian population. And $MSEI_O$ and $TSEI_O$ represent the military officer's SES index. Although this value is not explicitly known, it can be estimated using the MSEI and TSEI values from the mean

CPS indices. This study assumes that the average officer typically comes from a household in which the parent's highest education level is either some college or college graduate or higher.

As seen in Table 4.11, ratios of less than one indicate that including officers in the pool of USN and USAF personnel does explain some of the differences in SES representation between the military and civilian samples. Therefore, while the inclusion of officers increases the mean SES values of the service samples, the effects are relatively small because of the small proportion of officers in both services (7 and 14 percent in the USN and USAF, respectively).

5. Reason for Joining the Military

Persons join the military for a variety of reasons. Some of the more important reasons include: employment opportunities, educational benefits, retirement benefits, patriotism, leadership enhancement, family tradition, etc.... This section examines whether reasons for joining the military differ by SES characteristics. It is hypothesized that SES backgrounds may be lower for the military, because a large proportion of recruits join the military to gain educational benefits. Among the SES survey respondents, more than 50 percent of the recruits from both services selected educational benefits as their primary reason for joining the military. The remaining 50 percent of recruit responses were dispersed over 13 other reasons for joining the military, resulting in distributions too small to provide any detailed information regarding SES characteristics. Table 4.12 shows that the mean SES indices for recruits who joined the military to obtain money for college education is generally lower than mean SES indices for the samples as a whole, and that only slight differences exist. Therefore, the fact that

a majority of the recruits joined the military for its educational benefits does not help to explain differences in SES representation between the military and the civilian samples.

Table 4.12. Comparison of Mean Socioeconomic Indices (MSEIs and TSEIs)^a, by Reason for Joining the Military (Educational Benefits), for USN and USAF Recruits^b

Reason for Joining	MSEI		TSEI	
	USN	USAF	USN	USAF
Educational Benefits	36.65	36.91	34.34	34.72
Service Mean	36.53	37.07	34.67	34.78
Δ^c	+0.12	-0.16	-0.33	-0.06

^a MSEI represents the Male Socioeconomic Index, and TSEI represents the Total Socioeconomic Index. TSEI, by convention, is used to explain mother's socioeconomic background.

^b Includes non-prior service, active-duty enlisted accessions from 1989 to 1995.

^c Delta (Δ) represents the difference between the mean service SES Index and the mean SES Index for recruits who joined for educational benefits. A negative (-) indicates that the mean SES Index for those who selected educational benefits as a reason for joining is smaller than the individual service mean and positive (+) indicates that the individual service mean is smaller than the mean SES Index for recruits who chose educational benefits as a reason for joining the military.

Source: Derived from data provided by the Defense Manpower Data Center.

D. LOGIT MODEL RESULTS FOR FIRST-TERM ATTRITION

As previously discussed, logistic regression models were selected to determine the relationship between SES and first-term attrition. This section reviews the first-term attrition model variables, presents logit model results, and discusses three “typical” cases to explain the relationship between SES and first-term attrition.

1. Model

The following logit models were used to estimate the effects of SES and service member characteristics on first-term attrition. The models used are provided in Table 4.13 below, and the variables used in each model are explained in detail in Chapter III.

Table 4.13. Logistic Multivariate Regression Models for First-Term Attrition

Behavioral and Performance-Related Attrition (ATT1):
ATT1 = f (PSEI PSEI_NV P_NHSD P_SCOLL P_COLL OWN NOPAY SPHH S_DIST NC_DIST W_DIST BLACK HISPAN OTHMIN AGE)
Non-Behavioral Attrition (ATT2):
ATT2 = f (PSEI PSEI_NV P_NHSD P_SCOLL P_COLL OWN NOPAY SPHH S_DIST NC_DIST W_DIST BLACK HISPAN OTHMIN AGE)
Overall First-Term Attrition (ATT3):
ATT3 = f (PSEI PSEI_NV P_NHSD P_SCOLL P_COLL OWN NOPAY SPHH S_DIST NC_DIST W_DIST BLACK HISPAN OTHMIN AGE)

Overall first-term attrition is addressed in this section, while both behavioral-specific and non-behavioral-specific first-term attrition results are included in Appendix E. The ATT3 Logit model is used to determine whether SES indicators--parental socioeconomic index, parental education, and parental homeownership--affect a service member's likelihood of receiving either a behavioral or non-behavioral discharge prior to completion of his or her initial term of enlistment. A synopsis of the results of this logistic analysis are contained in Table 4.14, while Appendix E contains the comprehensive logistic regression results.

**Table 4.14. First-Term Overall Attrition (ATT3) Logit Model
Coefficient Estimates and Marginal Effects for USN
and USAF Recruits***

INDEPENDENT VARIABLE	USN		USAF	
	ATT3	MARGINAL EFFECTS	ATT3	MARGINAL EFFECTS
Parents Highest SES Index				
PSEI	.0018	.937	-.0001	-.044
PSEI_NV	.1367	3.343	-.0718	-1.498
Parents Highest Education				
P_NHSD	.0669	1.628	.0896	1.927
P_SCROLL	-.0723	-1.736	-.0992	-2.056
P_COLL	.0256	.62	.0530	1.132
Homeownership				
OWN	-.1486 ¹	-3.538	-.0022	-.047
NOPAY	-.1204	-2.876	-.1065	-2.204
Census District				
NC_DIST	-.1498 ¹	-3.568	.0922	1.974
S_DIST	-.1525 ²	-3.629	.1466 ³	3.186
W_DIST	-.1296 ³	-3.093	.0304	.645
Race/Ethnicity				
BLACK	.1126 ¹	2.749	-.1355	-2.787
HISPAN	-.1484 ³	-3.533	-.5827 ¹	-10.788
OTHMIN	-.6054 ¹	-13.488	-.2175	-4.396
Enlistee Age				
AGE	.0292 ¹	1.421	-.0346 ²	-1.445
Family Status				
Single Parent Household (SPHH)	.1451 ¹	3.55	.0460	.981

* Includes active-duty non-prior service enlisted accessions from 1989 to 1991.

Key:

¹ Significant at the .01 level

² Significant at the .05 level

³ Significant at the .10 level

Source: Derived from data provided by the Defense Manpower Data Center.

Analysis of the attrition model reveals that few variables have a statistically significant relationship on overall first-term enlisted attrition. Of the variables used to

describe SES, race/ethnicity and home ownership are the only two significant variables. As previously stated, home ownership is used as a proxy for income in this study. Therefore, the ATT3 model reveals that recruits from higher-income families are more likely to complete their first term of enlistment. Additionally, the model reveals mixed results with respect to first-term attrition for black enlistees, while Hispanic and other minorities are consistently less likely to be discharged prior to completion of their first term of enlistment. These results show that SES indicators--PSEI and parents' highest level of education--are relatively weak predictors of first-term attrition in the military.

2. "Typical" Cases

To better understand the relationship between these models, three “typical” cases are presented to explain the impact of SES indicators on first-term attrition. The first case is a notional enlistee whose parents' highest level of education is no high school diploma, and whose SES Index and home ownership is represented by the mean for parents who are non-high school graduates. The second and third cases follow the same logic but count parents' highest level of education as high school graduate and college graduate, respectively.

Table 4.15 illustrates the differences in probability of overall first-term attrition based on each of the “typical” cases discussed above. Based on overall attrition (ATT3), USN enlistees whose parents are non-high school graduates are 1.9 percent more likely to be discharged prior to completion of their first term of enlistment than are enlistees whose parents' highest level of education is high school graduate. This analysis holds true for overall attrition within the USAF as well. However, as Table 4.15 shows, USN and USAF enlistees whose parents are college graduates are 1.3 percent and 1.1 percent,

respectively, more likely to be discharged prior to completion of their first-term of enlistment than are enlistees whose parents' highest level of education is high school graduate. This finding is contrary to the hypothesized effect discussed in Chapter III, which states that the likelihood of first-term attrition would decrease as the recruit's parental education increases. As seen here, the differences are relatively small and insignificant, which again supports the finding that SES background is not a strong predictor of first-term attrition.

Table 4.15. Comparison of Marginal Effects Analysis for Overall First-Term Attrition (ATT3) Using Three "Typical" USN and USAF Recruit^a SES Backgrounds

Dependent Variable	Case 1 (NHSD) ^c	Δ^b	Case 2 (HSD) ^c	Δ^b	Case 3 (College Grad) ^c
	USN				
ATT3	39.3	1.9	37.4	1.3	38.7
Dependent Variable	USAF				
ATT3	33.1	2.0	31.1	1.1	32.2

^a Includes non-prior service, active-duty enlisted accessions from 1989 to 1991.

^b Delta (Δ) represents the percentage difference in the overall first-term attrition between Case 1 and Case 3 as compared with Case 2.

^c These represent the parents' highest level of education in a recruits household. NHSD, HSD, and College Grad stand for non-high school diploma, high school diploma, and college graduate, respectively.

Source: Derived from data provided by the Defense Manpower Data Center.

E. OLS MODEL RESULTS FOR USAF EPR

As previously discussed in Chapter III, an ordinary least squares (OLS) regression model was selected to determine the relationship between SES and the USAF EPR scores. This section reviews the model variables, presents OLS model results, and

discusses three "typical" cases to explain the relationship between SES and the USAF EPR scores.

1. Model

The following OLS model was used to estimate the relationship between SES and background characteristics of USAF recruits and the EPR scores. The model used is provided in Table 4.16 below, and the variables used in the model are explained in detail in Chapter III.

Table 4.16. Ordinary Least Squares Regression Model

$\text{EPR} = f(\text{PSEI PSEI_NV P_NHSD P_SCOLL P_COLL OWN NOPAY SPHH S_DIST NC_DIST W_DIST BLACK HISPAN OTHMIN AGE})$

The OLS model EPR was used to determine how SES indicators--parental socioeconomic index, parental education, and parental home ownership--are related to a service member's performance, as measured by the USAF EPR score.

Results of the EPR model in Table 4.17 show that the SES indicators PSEI, P_SCOLL, P_COLL, OWN, and NOPAY are significant and have a positive relationship to the USAF enlistee's EPR score. Recruits' SES Index (PSEI) and Parental Homeownership (OWN and NOPAY) tends to increase the USAF enlistee's EPR score, while Parental Education (P_SCOLL and P_COLL) tends to decrease the enlistee's EPR score. For instance, an increase of 10 points in PSEI results in a 0.18 point increase in USAF EPR score.

Other significant variables include BLACK and AGE. The largest relationship between SES and EPR score is observed for black airmen who, on average, score 2.6

points lower on EPR scores than white airmen. Additionally, as the recruit's age at time of enlistment increases, so does the EPR score. This suggests that older enlistees tend to receive higher marks on performance evaluations than do their younger counterparts.

Table 4.17. Results of Ordinary Least Squares (OLS) using Enlisted Performance Report (EPR) Model

INDEPENDENT VARIABLE	USAF			
	Parameter Estimate	Standard Error	T for HO: Para = 0	Prob > T
Parents Highest SES Index				
PSEI	0.0180	0.0073	2.461	0.0139
PSEI_NV	1.3589	0.4909	2.768	0.0056
Parents Highest Education				
P_NHSD	0.4218	0.4165	1.013	0.3112
P_SCOLL	-0.4737	0.2634	-1.799	0.0721
P_COLL	-1.3737	0.3225	-4.260	0.0001
Home Ownership				
OWN	0.8231	0.2812	2.927	0.0034
NOPAY	0.9144	0.5559	1.645	0.1000
Census District				
NC_DIST	0.3122	0.3922	0.796	0.4261
S_DIST	-0.2912	0.3742	-0.778	0.4365
W_DIST	-0.4947	0.4206	-1.176	0.2396
Race/Ethnicity				
BLACK	-2.5830	0.3309	-7.805	0.0001
HISPAN	0.3243	0.5526	0.587	0.5574
OTHMIN	-0.2282	0.5979	-0.382	0.7027
Enlistee Age				
AGE	0.4401	0.0526	8.361	0.0001
Family Status				
Single Parent Household (SPHH)	-0.2936	0.2698	-1.088	0.2765

Source: Derived from data provided by the Defense Manpower Data Center.

2. "Typical" Cases

To better understand the relationship in this model, three "typical" cases are presented to explain the relationship between SES indicators and performance, as

measured by EPR score.⁸⁰ Table 4.18 illustrates the differences in EPR score for changes based on each of these three cases.

Table 4.18. Comparison of Marginal Effects Analysis for Enlisted Performance Report (EPR) using Three “Typical” USAF Recruit’s^a SES Backgrounds

	Case 1 (NHSD)^c	Δ^b	Case 2 (HSD)^c	Δ^b	Case 3 (College Grad)^c
EPR	2.46	-0.05	2.51	-0.12	2.39

^a Includes non-prior service, active-duty enlisted accessions from 1989 to 1991.

^b Delta (Δ) represents the differences in EPR score between Case 1 and Case 3 as compared with Case 2.

^c These represent the parents' highest level of education in a recruits household. NHSD, HSD, and College Grad stand for non-high school diploma, high school diploma, and college graduate, respectively.

Source: Derived from data provided by the Defense Manpower Data Center.

As seen in Table 4.18, the differences between these cases are relatively small. The difference between a USAF recruit whose parents' highest level of education is high school graduate and a USAF recruit whose parents do not have a high school diploma is essentially nil. Similar results are found between a USAF recruit whose parents' highest level of education is high school graduate and a USAF recruit whose parents are college graduates. This suggests that SES indicators used in this study are relatively weak predictors of performance, as measured by USAF EPR scores.

⁸⁰ The “typical” cases for the OLS EPR model is defined the same way as for the first-term attrition models in this study.

V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

A. SUMMARY

This thesis attempts to answer two questions. First, what is the socioeconomic status of Navy and Air Force recruits in comparison with that of the general population? And, second, what is the relationship between a recruit's socioeconomic background and his or her performance? After reviewing previous research and creating a database that encompasses demographic, SES, and performance-based data, the authors use cross tabulation analysis and linear and logit multivariate models to determine SES representation and the relationship between SES and performance.

B. CONCLUSIONS

Clearly, the comment made by Lord Wellesley, Duke of Wellington, in 1813--that common soldiers are "the scum of the earth"--cannot be applied to U. S. enlisted forces in the 1990s. Successful efforts in all four services to recruit young men and women with a diploma and a relatively high score on the AFQT have significantly changed the composition of the rank and file. Recruits in the Navy and Air Force are of considerably higher quality than the "ill-educated and hapless" or "vagabonds and paupers" who fought to defend the nation's interests during certain earlier periods of American history.

This study suggests that recruits in the Navy and Air Force come from slightly lower socioeconomic backgrounds than do their 18-to 24-year-old civilian counterparts. While this may not be surprising, in light of previous research that reported similar differences,⁸¹ the authors also found that most of the disparities in SES can be explained

⁸¹For example, see Cooper (1977), Fredland and Little (1979), and Fernandez (1989).

by the fact that sailors and airmen are significantly underrepresented in the highest quartile and overrepresented in the lower two quartiles of socioeconomic class (see Figures 4.1 and 4.2). For example, in comparison with the parents of 18-to 24-year-olds in the general population, the parents of recruits in the Navy and Air Force are more likely to be non-high school graduates and work in blue collar occupations; and, further, the parents of these recruits are less likely to own homes, earn a college degree, or work as executives or professionals. Analysis of other likely causes of differences in SES representation between the military and general population--such as race/ethnicity, gender, inclusion of officers, family background, reasons for joining, and region--suggest that each of these factors has little to no effect on SES averages in both services.

Results of the linear and logit multivariate models used in this study indicate that further analysis of the relationship between SES and performance is required. The authors found that SES has small but significant effects on several measures of on-the-job performance in the Air Force, but does not explain first-term enlisted attrition in either the Navy or Air Force. Therefore, the authors conclude that, while SES does predict some aspects of performance in the military, it is a relatively weak predictor of first-term enlisted attrition.

C. RECOMMENDATIONS

Several recommendations for further research can be made as a result of this study. First, the usefulness of the database that was created for this study should be emphasized. The authors have merged data from a relatively untapped resource, the SES survey, with two separate personnel data files maintained by DMDC and the United States Air Force. Within the database maintained at the Naval Postgraduate School

Computer Center, demographic, SES, personnel loss actions, and performance-based data are available for over 20,000 non-prior service, active-duty enlisted accessions in both the Navy and Air Force. Continued analyses of the initial cohorts used in this study will allow researchers to track the survey respondents from 1989 to 1995 through the higher enlisted ranks to the end of their careers.

Further, DMDC should continue to merge additional cohorts of SES survey respondents, and both services should add performance variables to their current database. This would allow extended trend analyses of SES representation and the relationship between SES and on-the-job performance. To date, no data on subjective supervisors' evaluations were obtained for the Navy. With the receipt of additional performance variables, such as supervisors' evaluations, advancement exam scores, awards, and physical fitness scores, researchers can assess the relationship between SES and "promotability" in the Navy and Air Force. For example, inclusion of evaluation scores and advancement exam scores would provide future studies with a database that is capable of duplicating final multiple scores for the Navy at specific points in time.

This study represents initial exploratory analysis of the relationship between SES and military performance. As performance variables are added to the database, researchers may isolate the effects of SES on all of the measures used to determine promotion in the Navy and Air Force. Although the primary objective of this study is to examine the relationship between SES and the likelihood of "successful" service in the Navy and Air Force, isolating possible connections between socioeconomic origins and specific measures of military performance could also have an important effect on future manpower policy and training decisions. For instance, if recruits from lower SES

backgrounds have a more difficult time adjusting to life in the armed forces and do not perform as well as higher SES recruits, should the Navy and Air Force establish remedial programs to help individual sailors and airmen? What steps, if any, could be taken to ease the transition of these recruits to military life; and what training, if any, can both services provide to assist recruits who may face greater obstacles in career progression because of their SES backgrounds?

APPENDIX A. DEPARTMENT OF DEFENSE SURVEY OF RECRUITS SOCIOECONOMIC BACKGROUNDS



Department of Defense

SURVEY OF RECRUIT SOCIOECONOMIC BACKGROUNDS

This survey is being conducted to collect information on the socioeconomic backgrounds of new recruits entering military service. The information will become part of the group statistics provided in an annual report to Congress on this subject. The information will be used for research purposes; it will NOT become part of your personnel record and will NOT affect your military career in any way.

Public reporting burden for this collection is estimated to average .166 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302; and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503.

PRIVACY ACT STATEMENT FOR RECRUIT SOCIOECONOMIC SURVEY	
AUTHORITY:	10 USC 136, E.O. 9397.
PRINCIPAL PURPOSE(S):	Information provided on this form will be combined with information from other forms and will be included as group statistics in an annual report to Congress on population representation in the military. Personal identifiers are used to indicate active or non-active military service status. The survey will be used for analysis of socioeconomic factors in the military community.
ROUTINE USE(S):	None.
DISCLOSURE AND EFFECT(S) ON INDIVIDUAL OF NOT PROVIDING INFORMATION:	Voluntary. Failure to respond to this survey will not result in any unfavorable action to the individual.



INSTRUCTIONS FOR COMPLETING THIS QUESTIONNAIRE

- Use a No. 2 pencil.
- Make heavy black marks that will fill the circle for your answer.

INCORRECT MARKS



CORRECT MARK



- If you are asked to "MARK ONE" response, mark the circle beside the single best answer to the question.

EXAMPLE: Are you an officer or an enlistee? (MARK ONE)

- ☐ Officer
☒ Enlistee

- If you are asked to "MARK ALL THAT APPLY," you may mark more than one answer.

EXAMPLE: Are you currently: (MARK ALL THAT APPLY)

- ☒ In the Armed Forces
☐ Working full-time at a non-military job
☒ Working part-time at a non-military job

- If you are asked to give numbers for your answer,
 - Write the numbers in the boxes at the top of the grid, making sure that the last number is in the right-hand box.
 - Fill unused boxes with zeroes.

For example, you would write 35 as

0	3	5
---	---	---

 - Then, fill in the matching circle under each number.

For example, for 35 you would have:

0	3	5
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>

- If you are asked to write in an answer, PLEASE PRINT your answer.

1. Today's date is:

MONTH	DAY	YEAR
<input type="radio"/> January	<input type="radio"/> 01	<input type="radio"/> 1996
<input type="radio"/> February	<input type="radio"/> 11	<input type="radio"/> 1997
<input type="radio"/> March	<input type="radio"/> 22	
<input type="radio"/> April	<input type="radio"/> 33	
<input type="radio"/> May	<input type="radio"/> 44	
<input type="radio"/> June	<input type="radio"/> 55	
<input type="radio"/> July	<input type="radio"/> 66	
<input type="radio"/> August	<input type="radio"/> 77	
<input type="radio"/> September	<input type="radio"/> 88	
<input type="radio"/> October	<input type="radio"/> 99	
<input type="radio"/> November		
<input type="radio"/> December		

2. Mark the circle beside the location of your Recruit Training Center.

Army

- ☐ Fort Benning, GA
- ☐ Fort Jackson, SC
- ☐ Fort Knox, KY
- ☐ Fort Leonard Wood, MO
- ☐ Fort McClellan, AL
- ☐ Fort Sill, OK

Marine Corps

- ☐ Parris Island, SC
- ☐ San Diego, CA
(Marine Recruit Depot)

Air Force

- ☐ Lackland AFB, TX

Navy

- ☐ Great Lakes, IL

3. What is your branch of service and component?

- | | |
|---|--|
| <input type="radio"/> Army National Guard | <input type="radio"/> Marine Corps Reserve |
| <input type="radio"/> Army Reserve | <input type="radio"/> Regular Marine Corps |
| <input type="radio"/> Regular Army | <input type="radio"/> Air National Guard |
| <input type="radio"/> Navy Reserve | <input type="radio"/> Air Force Reserve |
| <input type="radio"/> Regular Navy | <input type="radio"/> Regular Air Force |

4. Did you enlist for service in the Navy TAR program (Training Administration Reserve)?

- ☐ Yes ☐ No

5. If you have ever served in the military prior to your current enlistment, in which branch(es) did you serve? (MARK ALL THAT APPLY)

- | | |
|---|--|
| <input type="radio"/> Army National Guard | <input type="radio"/> Marine Corps Reserve |
| <input type="radio"/> Army Reserve | <input type="radio"/> Regular Marine Corps |
| <input type="radio"/> Regular Army | <input type="radio"/> Air National Guard |
| <input type="radio"/> Navy Reserve | <input type="radio"/> Air Force Reserve |
| <input type="radio"/> Regular Navy | <input type="radio"/> Regular Air Force |
| <input type="radio"/> Never served | |

6. Your Name:

Print your name here →

Then fill in the matching circle under each letter of your name →

LAST															FIRST															MIDDLE INITIAL
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		
A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A		
B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B		
C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C		
D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D		
E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E		
F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G		
H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H		
I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I		
J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J	J		
K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K		
L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L		
M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M		
N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N		
O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O		
P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P		
Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q	Q		
R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R		
S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S		
T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T		
U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U		
V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V		
W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W		
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		
Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z		

7. Date of Birth:

MONTH		DAY		YEAR	
0	1	0	1	0	0
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9

8. Social Security Number:

0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9

9. What race do you consider yourself to be? Are you: (MARK ONE)

- ☐ American Indian or Alaskan Native
☐ Black
☐ Asian or Pacific Islander
☐ White
☐ Other race

10. Are you? (MARK ONE)

- ☐ Hispanic origin or descent
☐ Not of Hispanic origin or descent

11. Are you male or female?

- ☐ Male
☐ Female

12. What is the HIGHEST level of schooling you have COMPLETED? (MARK ONE ONLY)

Elementary

- 1st grade
 2nd grade
 3rd grade
 4th grade
 5th grade
 6th grade
 7th grade
 8th grade

High School

- 9th grade
 10th grade
 11th grade
 12th grade

College

- 1st year
 2nd year
 3rd year
 4th year
 5th year
 6th year or more

13. What type of high school did you attend last as a regular, full-time student? (MARK ONE ONLY)

- ☐ Public school
☐ Parochial school (such as Catholic or other religious school)
☐ Private, non-parochial school
☐ Not applicable – I did not attend any high school.

14. Right before you first signed your enlistment contract and were sworn in, were you working at a paid job or in a business or farm? (MARK ONE)

- ☐ Yes, I was working full-time.
☐ Yes, I was working part-time.
☐ No, I was temporarily absent/on layoff from a job or business.
☐ No, I was without a job and looking for work.
☐ No, I was not working and not looking for work.



15. Below are some reasons people have for enlisting in the military.
Please indicate whether each reason is true or not true for you.

I enlisted because . . .	True	Not True
a. I was unemployed and could not find a job	<input type="radio"/>	<input type="radio"/>
b. I wanted to give myself a chance to be away from home on my own	<input type="radio"/>	<input type="radio"/>
c. The military will give me a chance to better myself in life	<input type="radio"/>	<input type="radio"/>
d. I want to travel and live in different places	<input type="radio"/>	<input type="radio"/>
e. I want to get away from a personal problem	<input type="radio"/>	<input type="radio"/>
f. I want to serve my country	<input type="radio"/>	<input type="radio"/>
g. I can earn more money than I could as a civilian	<input type="radio"/>	<input type="radio"/>
h. It is a family tradition to serve	<input type="radio"/>	<input type="radio"/>
i. I want to prove that I can make it	<input type="radio"/>	<input type="radio"/>
j. I want to get trained in a skill that will help me get a civilian job or enhance my job	<input type="radio"/>	<input type="radio"/>
k. I want the retirement or fringe benefits	<input type="radio"/>	<input type="radio"/>
l. I can get money for a college education	<input type="radio"/>	<input type="radio"/>
m. I want additional income	<input type="radio"/>	<input type="radio"/>
n. I want to develop leadership skills	<input type="radio"/>	<input type="radio"/>

16. Which one of the reasons in Question 15 was your most important reason for enlisting in the military?

☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G ☐ H ☐ I ☐ J ☐ K ☐ L ☐ M ☐ N

17. In what month and year did you last live with your parent(s), step-parent(s), or guardian(s)?

MONTH	YEAR
<input type="radio"/> January	19 <input type="text"/> <input type="text"/>
<input type="radio"/> February	
<input type="radio"/> March	0 <input type="text"/> 0 <input type="text"/>
<input type="radio"/> April	1 <input type="text"/> 1 <input type="text"/>
<input type="radio"/> May	2 <input type="text"/> 2 <input type="text"/>
<input type="radio"/> June	3 <input type="text"/> 3 <input type="text"/>
<input type="radio"/> July	4 <input type="text"/> 4 <input type="text"/>
<input type="radio"/> August	5 <input type="text"/> 5 <input type="text"/>
<input type="radio"/> September	6 <input type="text"/> 6 <input type="text"/>
<input type="radio"/> October	7 <input type="text"/> 7 <input type="text"/>
<input type="radio"/> November	8 <input type="text"/> 8 <input type="text"/>
<input type="radio"/> December	9 <input type="text"/> 9 <input type="text"/>

18. What was the address of the household in which you last lived with your parent(s), step-parent(s), or guardian(s)?

Street Address	
City or Town	State

What is the ZIP Code at that address? →

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
0	0	0	0	0	0
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9

19. Did your parent(s), step-parent(s), or guardian(s) own or rent the residence in Question 18 when you lived there last? (MARK ONE)

- ☐ Owned or were buying it (for example, with a mortgage)
☐ Rented it
☐ Occupied it without payment of rent

20. Which of these people were in your household when you last lived there with your parent(s), step-parent(s), or guardian(s) at the address in Question 18? (MARK ALL THAT APPLY)

- ☐ Father
☐ Stepfather
☐ Male guardian

IF YOU MARKED ONE OF THESE, please complete SECTION A on pages 6–8.

- ☐ Mother
☐ Stepmother
☐ Female guardian

IF YOU MARKED ONE OF THESE, please complete SECTION B on pages 9–11.

NOTE: If you marked one in each set, you will complete BOTH Section A and Section B.



SECTION A

- Answer the questions in Section A for the adult male you marked in Question 20.
- If no adult male is marked in Question 20, GO TO SECTION B.

21. What is the **HIGHEST** level of schooling your father (stepfather) (male guardian) **COMPLETED**? (MARK ONE)

☐ Less than 4 years of high school
☐ 4 years of high school
☐ Some college, but less than 4 years
☐ 4 years of college
☐ More than 4 years of college

22. Did your father (stepfather) (male guardian) have any vocational/technical training after high school?
- ☐ Yes ☐ No

23. How old is your father (stepfather) (male guardian)? (IF YOU ARE NOT SURE, BUT THINK YOU KNOW HIS AGE WITHIN ONE YEAR, PUT DOWN YOUR BEST GUESS.)

0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9

Age in years

☐ Don't know

☐ No longer living

GO TO QUESTION 28

24. Is your father (stepfather) (male guardian): (MARK ONE CIRCLE)

☐ American Indian/Alaskan Native
☐ Black/Negro/African-American
☐ Oriental/Asian/Chinese/Japanese/
 Korean/Filipino/Pacific Islander
☐ White/Caucasian
☐ Other (Specify in the box below)

25. Is your father (stepfather) (male guardian) of Spanish/Hispanic origin or descent? (MARK ONE)
- ☐ Yes ☐ No

26. Is your father (stepfather) (male guardian) currently: (MARK ONE)

☐ Married ☐ Widowed
☐ Divorced ☐ Single, never married
☐ Legally separated

27. Is your father (stepfather) (male guardian) currently retired from a job or occupation? (MARK ONE)
- ☐ Yes ☐ No

28. What is the most recent month and year your father (stepfather) (male guardian) worked at a paid job or in a business or farm? (IF HE IS CURRENTLY WORKING, WRITE THE CURRENT MONTH AND YEAR.)

☐ Don't know

MONTH	YEAR																						
<input type="radio"/> Jan. <input type="radio"/> Feb. <input type="radio"/> Mar. <input type="radio"/> Apr. <input type="radio"/> May <input type="radio"/> Jun. <input type="radio"/> Jul. <input type="radio"/> Aug. <input type="radio"/> Sep. <input type="radio"/> Oct. <input type="radio"/> Nov. <input type="radio"/> Dec.	19 <table border="1" style="border-collapse: collapse; text-align: center;"> <tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td></tr> <tr><td>0</td><td>0</td></tr> <tr><td>1</td><td>1</td></tr> <tr><td>2</td><td>2</td></tr> <tr><td>3</td><td>3</td></tr> <tr><td>4</td><td>4</td></tr> <tr><td>5</td><td>5</td></tr> <tr><td>6</td><td>6</td></tr> <tr><td>7</td><td>7</td></tr> <tr><td>8</td><td>8</td></tr> <tr><td>9</td><td>9</td></tr> </table>			0	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9
0	0																						
1	1																						
2	2																						
3	3																						
4	4																						
5	5																						
6	6																						
7	7																						
8	8																						
9	9																						

29. Is your father (stepfather) (male guardian) currently working at a paid job or in a business or farm? (MARK ONE ONLY)

☐ Yes, he is currently working.

IN QUESTIONS 30-35, DESCRIBE HIS CURRENT JOB. IF HE HAS MORE THAN ONE JOB, DESCRIBE THE ONE AT WHICH HE WORKS THE MOST HOURS.

☐ No, he is temporarily absent/on layoff from a job or business.

IN QUESTIONS 30-35, DESCRIBE THE JOB FROM WHICH HE IS TEMPORARILY ABSENT OR ON LAYOFF.

☐ No, he is without a job and looking for work.

IN QUESTIONS 30-35, DESCRIBE THE LAST FULL-TIME JOB HE HAD FOR TWO WEEKS OR MORE.

☐ No, he is not working now and not looking for work.

IN QUESTIONS 30-35, DESCRIBE THE LAST FULL-TIME OR PART-TIME JOB HE HELD.

☐ No, he is no longer living.

IN QUESTIONS 30-35, DESCRIBE THE LAST FULL-TIME OR PART-TIME JOB HE HELD.

☐ No, he has never worked for pay.

GO TO SECTION B

☐ Don't know

<p>30. For whom does (did) your father (stepfather) (male guardian) work? (Name of company, business organization, or other employer)</p> <p>_____</p> <p>Please print</p> <p>_____</p> <p>_____</p>	<p>Don't know</p>
<p>31. What kind of business or industry is (was) this? (For example: Hospital, newspaper publishing, mail order house, auto engine manufacturing, breakfast cereal manufacturing)</p> <p>_____</p> <p>Please print</p> <p>_____</p> <p>_____</p>	<p>Don't know</p>
<p>32. What kind of work is (was) he doing – what is his job called? (For example: Doctor, personnel manager, supervisor of order department, gasoline engine assembler, grinder operator)</p> <p>_____</p> <p>Please print</p> <p>_____</p> <p>_____</p>	<p>Don't know</p>
<p>33. What are (were) your father's (stepfather's) (male guardian's) most important activities or duties at this job? (For example: Patient care, directing hiring policies, supervising order clerks, assembling engines, operating grinding mill)</p> <p>_____</p> <p>Please print</p> <p>_____</p> <p>_____</p>	<p>Don't know</p>

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34. Which of the categories below comes closest to describing his job?

(READ ENTIRE LIST, THEN MARK ONE)

- ☐ CLERICAL OR ADMINISTRATIVE SUPPORT (secretary, bookkeeper, mail-room supervisor, mail clerk, keypunch operator, bank teller, etc.)
- ☐ CONSTRUCTION, MINING, OR DRILLING (skilled construction worker such as carpenter, plumber supervisor, roofer; also miner, well driller, etc.)
- ☐ CRAFT OR PRECISION PRODUCTION (tool-and-die maker, cabinet maker, engraving supervisor, printer, gem cutter, etc.)
- ☐ EXECUTIVE, ADMINISTRATIVE, OR MANAGERIAL (company executive, personnel manager, accountant, school principal, public official, etc.)
- ☐ FARMING, FORESTRY, OR FISHING (farm owner, farmworker, field supervisor, gardener, logger; fisherman, etc.)
- ☐ LABORER, HELPER, HANDLER, EQUIPMENT CLEANER (unskilled construction worker, dock worker, machinist helper, stock handler, car washer, etc.)
- ☐ MACHINE OPERATOR, ASSEMBLER, OR INSPECTOR (punch press operator, sewing machine operator, mill supervisor, furniture assembler; meat inspector, etc.)
- ☐ MECHANIC OR REPAIRER (automobile or aircraft mechanic, maintenance supervisor, television repairer, locksmith, etc.)
- ☐ MILITARY SERVICE in the Active Duty Army, Navy, Air Force, or Marine Corps.
- ☐ PROFESSIONAL (doctor, registered nurse, lawyer, engineer, scientist, teacher, social worker, etc.)
- ☐ PROTECTIVE SERVICE (police officer, firefighter, security guard, etc.)
- ☐ SALES (real estate or insurance agent, sales clerk, retail store manager, automobile salesman, etc.)
- ☐ SERVICE OCCUPATION (waiter, cook, beautician, housekeeper, janitor supervisor, child care worker, hospital orderly, etc.)
- ☐ TECHNICIAN (computer programmer, dental hygienist, licensed practical nurse, laboratory technician, air traffic controller, etc.)
- ☐ TRANSPORTATION OR MATERIAL MOVING (truck or bus driver, railroad conductor, barge captain, bulldozer operator, etc.)
- ☐ DON'T KNOW
- ☐ NEVER WORKED

35. Is (was) your father (stepfather) (male guardian) — (MARK ONE)

- ☐ Employee of private company, business, or individual for wages, salary, or commissions
- ☐ Federal government employee
- ☐ State government employee
- ☐ Local government employee (city, county, town employee, etc.)
- ☐ Self-employed in own business, professional practice, or farm
- ☐ Working without pay in family business or farm
- ☐ Don't know

END OF SECTION A



SECTION B

- Answer the questions in Section B for the adult female you marked in Question 20.
- If no adult female is marked in Question 20, your questionnaire is now complete. Thank you for participating.

36. What is the **HIGHEST** level of schooling your mother (stepmother) (female guardian) **COMPLETED?** (MARK ONE)

- ☐ Less than 4 years of high school
- ☐ 4 years of high school
- ☐ Some college, but less than 4 years
- ☐ 4 years of college
- ☐ More than 4 years of college

37. Did your mother (stepmother) (female guardian) have any vocational/technical training after high school?

- ☐ Yes
- ☐ No

38. How old is your mother (stepmother) (female guardian)? (IF YOU ARE NOT SURE, BUT THINK YOU KNOW HER AGE WITHIN ONE YEAR, PUT DOWN YOUR BEST GUESS.)

0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9

Age in years

☐ Don't know

☐ No longer living

GO TO QUESTION 43

39. Is your mother (stepmother) (female guardian): (MARK ONE CIRCLE)

- ☐ American Indian/Alaskan Native
- ☐ Black/Negro/African-American
- ☐ Oriental/Asian/Chinese/Japanese/
Korean/Filipino/Pacific Islander
- ☐ White/Caucasian
- ☐ Other (Specify in the box below)

40. Is your mother (stepmother) (female guardian) of Spanish/Hispanic origin or descent? (MARK ONE)

- ☐ Yes
- ☐ No

41. Is your mother (stepmother) (female guardian) currently: (MARK ONE)

- ☐ Married
- ☐ Widowed
- ☐ Divorced
- ☐ Single, never married
- ☐ Legally separated

42. Is your mother (stepmother) (female guardian) currently retired from a job or occupation? (MARK ONE)

- ☐ Yes
- ☐ No

43. What is the most recent month and year your mother (stepmother) (female guardian) worked at a paid job or in a business or farm? (IF SHE IS CURRENTLY WORKING, WRITE THE CURRENT MONTH AND YEAR.)

☐ Don't know

MONTH	19	YEAR
<input type="radio"/> Jan.	<div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">1</div>	<div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">9</div>
<input type="radio"/> Feb.	<div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">2</div>	<div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">0</div>
<input type="radio"/> Mar.	<div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">3</div>	<div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">1</div>
<input type="radio"/> Apr.	<div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">4</div>	<div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">2</div>
<input type="radio"/> May	<div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">5</div>	<div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">3</div>
<input type="radio"/> Jun.	<div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">6</div>	<div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">4</div>
<input type="radio"/> Jul.	<div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">7</div>	<div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">5</div>
<input type="radio"/> Aug.	<div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">8</div>	<div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">6</div>
<input type="radio"/> Sep.	<div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">9</div>	<div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">7</div>
<input type="radio"/> Oct.	<div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">0</div>	<div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">8</div>
<input type="radio"/> Nov.	<div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">1</div>	<div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">9</div>
<input type="radio"/> Dec.	<div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">2</div>	<div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">0</div>

44. Is your mother (stepmother) (female guardian) currently working at a paid job or in a business or farm? (MARK ONE ONLY)

Yes, she is currently working ☐

IN QUESTIONS 45-50, DESCRIBE HER CURRENT JOB. IF SHE HAS MORE THAN ONE JOB, DESCRIBE THE ONE AT WHICH SHE WORKS THE MOST HOURS.

No, she is temporarily absent/on layoff from a job or business. ☐

IN QUESTIONS 45-50, DESCRIBE THE JOB FROM WHICH SHE IS TEMPORARILY ABSENT OR ON LAYOFF.

No, she is without a job and looking for work. ☐

IN QUESTIONS 45-50, DESCRIBE THE LAST FULL-TIME JOB SHE HAD FOR TWO WEEKS OR MORE.

No, she is not working now and not looking for work. ☐

IN QUESTIONS 46-50, DESCRIBE THE LAST FULL-TIME OR PART-TIME JOB SHE HELD.

No, she is no longer living. ☐

IN QUESTIONS 48-50, DESCRIBE THE LAST FULL-TIME OR PART-TIME JOB SHE HELD.

No, she has never worked for pay. ☐

IF SHE HAS NEVER WORKED FOR PAY, YOUR QUESTIONNAIRE IS NOW COMPLETE.

Don't know ☐

<p>45. For whom does (did) your mother (stepmother) (female guardian) work? (Name of company, business organization, or other employer)</p> <p>_____</p> <p>Please print _____</p> <p>_____</p> <p>_____</p>	<p>Don't know <input type="radio"/></p>
<p>46. What kind of business or industry is (was) this? (For example: Hospital, newspaper publishing, mail order house, auto engine manufacturing, breakfast cereal manufacturing)</p> <p>_____</p> <p>Please print _____</p> <p>_____</p> <p>_____</p>	<p>Don't know <input type="radio"/></p>
<p>47. What kind of work is (was) she doing – what is her job called? (For example: Doctor, personnel manager, supervisor of order department, gasoline engine assembler, grinder operator)</p> <p>_____</p> <p>Please print _____</p> <p>_____</p> <p>_____</p>	<p>Don't know <input type="radio"/></p>
<p>48. What are (were) your mother's (stepmother's) (female guardian's) most important activities or duties at this job? (For example: Patient care, directing hiring policies, supervising order clerks, assembling engines, operating grinding mill)</p> <p>_____</p> <p>Please print _____</p> <p>_____</p> <p>_____</p>	<p>Don't know <input type="radio"/></p>

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49. Which of the categories below comes closest to describing her job?
(READ ENTIRE LIST, THEN MARK ONE)

- ☐ CLERICAL OR ADMINISTRATIVE SUPPORT (secretary, bookkeeper, mail-room supervisor, mail clerk, keypunch operator, bank teller, etc.)
- ☐ CONSTRUCTION, MINING, OR DRILLING (skilled construction worker such as carpenter, plumber supervisor, roofer; also miner, well driller, etc.)
- ☐ CRAFT OR PRECISION PRODUCTION (tool-and-die maker, cabinet maker, engraving supervisor, printer, gem cutter, etc.)
- ☐ EXECUTIVE, ADMINISTRATIVE, OR MANAGERIAL (company executive, personnel manager, accountant, school principal, public official, etc.)
- ☐ FARMING, FORESTRY, OR FISHING (farm owner, farmworker, field supervisor, gardener, logger, fisherman, etc.)
- ☐ LABORER, HELPER, HANDLER, EQUIPMENT CLEANER (unskilled construction worker, dock worker, machinist helper, stock handler, car washer, etc.)
- ☐ MACHINE OPERATOR, ASSEMBLER, OR INSPECTOR (punch press operator, sewing machine operator, mill supervisor, furniture assembler, meat inspector, etc.)
- ☐ MECHANIC OR REPAIRER (automobile or aircraft mechanic, maintenance supervisor, television repairer, locksmith, etc.)
- ☐ MILITARY SERVICE in the Active Duty Army, Navy, Air Force, or Marine Corps.
- ☐ PROFESSIONAL (doctor, registered nurse, lawyer, engineer, scientist, teacher, social worker, etc.)
- ☐ PROTECTIVE SERVICE (police officer, firefighter, security guard, etc.)
- ☐ SALES (real estate or insurance agent, sales clerk, retail store manager, automobile salesman, etc.)
- ☐ SERVICE OCCUPATION (waitress, cook, beautician, housekeeper, janitor supervisor, child care worker, hospital orderly, etc.)
- ☐ TECHNICIAN (computer programmer, dental hygienist, licensed practical nurse, laboratory technician, air traffic controller, etc.)
- ☐ TRANSPORTATION OR MATERIAL MOVING (truck or bus driver, railroad conductor, barge captain, bulldozer operator, etc.)
- ☐ DON'T KNOW
- ☐ NEVER WORKED

50. Is (was) your mother (stepmother) (female guardian) — (MARK ONE)

- ☐ Employee of private company, business, or individual for wages, salary, or commissions
- ☐ Federal government employee
- ☐ State government employee
- ☐ Local government employee (city, county, town employee, etc.)
- ☐ Self-employed in own business, professional practice, or farm
- ☐ Working without pay in family business or farm
- ☐ Don't know

END OF SECTION B

THANK YOU FOR YOUR COOPERATION IN THIS SURVEY

[Faint, illegible text covering the majority of the page, likely bleed-through from the reverse side.]

**APPENDIX B. NAVY “WISHLIST” FOR ADDITIONAL, SERVICE-
PROVIDED PERFORMANCE MEASURES**

1. Evaluations—categorical scores for each grading area; overall score ranking.
2. Advancement Exam Scores.
3. Education and Training—performance scores and class ranking for “A” Schools and “C” Schools.
4. Awards—type and number of each type; also, if awarded during shore tour or operational tour.
5. Physical Fitness—pass/fail (performance evaluations).
6. Alcohol, Drug Abuse Problems—yes/no.
7. Family Advocacy Problems—yes/no.
8. Other Problems While in Service—NJP (Article 15), court-martial, letters of reprimand, security incidents, etc.

APPENDIX C. AIR FORCE “WISHLIST” FOR ADDITIONAL, SERVICE-PROVIDED PERFORMANCE MEASURES

1. Air Force Advancement

Weighted Airman Promotion System (WAPS) scores (including skills test scores, professional knowledge test scores, decoration points, enlisted performance rating scores).

2. Weight Management Program Scores.

3. Alcohol, Drug Abuse Problems—yes/no.

4. Family Advocacy Problems—yes/no.

5. Other Legal Problems—NJP (Article 15), court-martial, letters of reprimand, security incidents, etc.

6. STEP Promotion—Stripes for Excellence in Performance, based on CO’s recommendation (2-3%).

7. Promotion Tempo Indicators.

APPENDIX D. ORDINARY LEAST SQUARES (OLS) REGRESSION RESULTS FOR ARMED FORCES QUALIFICATION TEST (AFQT)

The tables shown below are the actual SAS output listings.

Table D-1 - USN AFQT OLS Results

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	15	1105313.7334	73687.582225	220.647	0.0001
Error	19496	6510902.2543	333.9609281		
C Total	19511	7616215.9876			
Root MSE	18.27460	R-square	0.1451		
Dep Mean	59.07406	Adj R-sq	0.1445		
C.V.	30.93506				

Parameter Estimates					
Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > T
INTERCEP	1	47.452123	1.19176573	39.817	0.0001
PSEI	1	0.119604	0.00873224	13.697	0.0001
PSEI_NV	1	-0.458490	0.53114566	-0.863	0.3880
P_NHSD	1	-2.276764	0.45979136	-4.952	0.0001
P_SCOLL	1	4.066017	0.33425344	12.164	0.0001
P_COLL	1	4.396647	0.38787119	11.335	0.0001
OWN	1	0.283212	0.32996697	0.858	0.3907
NOPAY	1	-2.960819	0.70381923	-4.207	0.0001
S_DIST	1	0.532170	0.40358822	1.319	0.1873
NC_DIST	1	0.048245	0.43266611	0.112	0.9112
W_DIST	1	-0.323675	0.45844460	-0.706	0.4802
BLACK	1	-14.947392	0.36915945	-40.490	0.0001
HISPAN	1	-5.073018	0.48118081	-10.543	0.0001
OTHMIN	1	-5.567307	0.74505033	-7.472	0.0001
AGE	1	0.412639	0.05494710	7.510	0.0001
SPHH	1	1.807032	0.31293819	5.774	0.0001

APPENDIX D (CONTINUED)

The tables shown below are the actual SAS output listings.

Table D-2 - USAF AFQT OLS Results

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	15	275215.55426	18347.70362	75.393	0.0001
Error	15018	3654771.0056	243.35936913		
C Total	15033	3929986.5599			
Root MSE	15.59998	R-square	0.0700		
Dep Mean	67.30258	Adj R-sq	0.0691		
C.V.	23.17887				

Parameter Estimates					
Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > T
INTERCEP	1	42.244458	1.36536461	30.940	0.0001
PSEI	1	0.080012	0.00853135	9.379	0.0001
PSEI_NV	1	-0.921580	0.57850649	-1.593	0.1112
P_NHSD	1	-0.617051	0.50769177	-1.215	0.2242
P_SCOLL	1	2.597415	0.31759348	8.178	0.0001
P_COLL	1	2.922450	0.37557341	7.781	0.0001
OWN	1	0.374796	0.33720505	1.111	0.2664
NOPAY	1	-2.467280	0.66945913	-3.685	0.0002
S_DIST	1	-0.946851	0.36789658	-2.574	0.0101
NC_DIST	1	0.613213	0.39943040	1.535	0.1248
W_DIST	1	0.090541	0.43569056	0.208	0.8354
BLACK	1	-6.510568	0.41884743	-15.544	0.0001
HISPAN	1	-4.165962	0.67461230	-6.175	0.0001
OTHMIN	1	-2.008560	0.71895068	-2.794	0.0052
AGE	1	1.093496	0.06567801	16.649	0.0001
SPHH	1	1.073673	0.32006147	3.355	0.0008

APPENDIX E. FIRST-TERM ATTRITION LOGIT MODEL RESULTS

The tables shown below are part of the actual SAS output listings.

Table E-1 - USN Behavioral Attrition (ATT1) Logit Model Results

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	11476.010	11436.002	.
SC	11483.225	11551.441	.
-2 LOG L	11474.010	11404.002	70.008 with 15 DF (p=0.0001)
Score	.	.	70.979 with 15 DF (p=0.0001)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio
INTERCPT	1	-1.1619	0.2024	32.9506	0.0001	.	.
PSEI	1	0.00165	0.00154	1.1452	0.2845	0.018593	1.002
PSEI_NV	1	0.0904	0.0908	0.9897	0.3198	0.015352	1.095
P_NHSD	1	-0.0217	0.0767	0.0799	0.7774	-0.003986	0.979
P_SCOLL	1	-0.0791	0.0586	1.8212	0.1772	-0.020070	0.924
P_COLL	1	0.0232	0.0680	0.1168	0.7325	0.005433	1.023
OWN	1	-0.1454	0.0564	6.6378	0.0100	-0.035714	0.865
NOPAY	1	-0.0936	0.1282	0.5328	0.4654	-0.009721	0.911
NC_DIST	1	-0.1855	0.0744	6.2156	0.0127	-0.044618	0.831
S_DIST	1	-0.1968	0.0694	8.0329	0.0046	-0.053132	0.821
W_DIST	1	-0.1917	0.0793	5.8429	0.0156	-0.042461	0.826
BLACK	1	0.2201	0.0604	13.3014	0.0003	0.048200	1.246
HISPAN	1	-0.1077	0.0866	1.5464	0.2137	-0.016876	0.898
OTHMIN	1	-0.3129	0.1531	4.1778	0.0410	-0.028694	0.731
AGE	1	0.0131	0.00933	1.9681	0.1606	0.017475	1.013
SPHH	1	0.1670	0.0537	9.6748	0.0019	0.041814	1.182

APPENDIX E (CONTINUED)

The tables shown below are part of the actual SAS output listings.

Table E-2 - USN Behavioral Attrition (ATT2) Logit Model Results

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	6622.756	6616.710	.
SC	6629.971	6732.148	.
-2 LOG L	6620.756	6584.710	36.047 with 15 DF (p=0.0017)
Score	.	.	34.352 with 15 DF (p=0.0030)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio
INTERCPT	1	-3.0095	0.2785	116.7999	0.0001	.	.
PSEI	1	0.00118	0.00223	0.2824	0.5951	0.013323	1.001
PSEI_NV	1	0.1537	0.1311	1.3749	0.2410	0.026109	1.166
P_NHSD	1	0.2058	0.1073	3.6825	0.0550	0.037853	1.229
P_SCOLL	1	-0.0177	0.0853	0.0428	0.8361	-0.004479	0.983
P_COLL	1	0.0160	0.0991	0.0262	0.8715	0.003750	1.016
OWN	1	-0.0657	0.0825	0.6347	0.4256	-0.016150	0.936
NOPAY	1	-0.1025	0.1893	0.2931	0.5883	-0.010644	0.903
NC_DIST	1	0.0184	0.1101	0.0281	0.8669	0.004436	1.019
S_DIST	1	0.0363	0.1031	0.1239	0.7248	0.009799	1.037
W_DIST	1	0.0808	0.1155	0.4895	0.4842	0.017904	1.084
BLACK	1	-0.1973	0.0923	4.5714	0.0325	-0.043194	0.821
HISPAN	1	-0.1492	0.1223	1.4866	0.2227	-0.023380	0.861
OTHMIN	1	-1.0458	0.2906	12.9521	0.0003	-0.095892	0.351
AGE	1	0.0427	0.0125	11.6949	0.0006	0.057019	1.044
SPHH	1	0.0119	0.0787	0.0228	0.8799	0.002980	1.012

APPENDIX E (CONTINUED)

The tables shown below are part of the actual SAS output listings.

Table E-3 - USN Behavioral Attrition (ATT3) Logit Model Results

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	13132.135	13076.676	.
SC	13139.349	13192.115	.
-2 LOG L	13130.135	13044.676	85.459 with 15 DF (p=0.0001)
Score	.	.	84.865 with 15 DF (p=0.0001)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio
INTERCPT	1	-1.0137	0.1852	29.9642	0.0001	.	.
PSEI	1	0.00184	0.00141	1.7048	0.1917	0.020689	1.002
PSEI_NV	1	0.1367	0.0835	2.6835	0.1014	0.023229	1.147
P_NHSD	1	0.0669	0.0699	0.9168	0.3383	0.012309	1.069
P_SCOLL	1	-0.0723	0.0534	1.8341	0.1756	-0.018351	0.930
P_COLL	1	0.0256	0.0622	0.1695	0.6806	0.005986	1.026
OWN	1	-0.1486	0.0520	8.1724	0.0043	-0.036505	0.862
NOPAY	1	-0.1204	0.1177	1.0473	0.3061	-0.012504	0.887
NC_DIST	1	-0.1498	0.0686	4.7654	0.0290	-0.036047	0.861
S_DIST	1	-0.1525	0.0642	5.6350	0.0176	-0.041176	0.859
W_DIST	1	-0.1296	0.0728	3.1649	0.0752	-0.028707	0.878
BLACK	1	0.1126	0.0561	4.0285	0.0447	0.024663	1.119
HISPAN	1	-0.1484	0.0780	3.6212	0.0570	-0.023255	0.862
OTHMIN	1	-0.6054	0.1425	18.0441	0.0001	-0.055514	0.546
AGE	1	0.0292	0.00852	11.7786	0.0006	0.039043	1.030
SPHH	1	0.1451	0.0494	8.6289	0.0033	0.036336	1.156

APPENDIX E (CONTINUED)

The tables shown below are part of the actual SAS output listings.

Table E-4 - USAF Behavioral Attrition (ATT1) Logit Model Results

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	5973.430	5954.977	.
SC	5980.257	6064.207	.
-2 LOG L	5971.430	5922.977	48.453 with 15 DF (p=0.0001)
Score	.	.	47.341 with 15 DF (p=0.0001)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio
INTERCPT	1	0.0393	0.3710	0.0112	0.9156	.	.
PSEI	1	-0.00361	0.00232	2.4369	0.1185	-0.038247	0.996
PSEI_NV	1	-0.0188	0.1559	0.0146	0.9040	-0.002559	0.981
P_NHSD	1	0.0307	0.1244	0.0607	0.8053	0.004859	1.031
P_SCOLL	1	-0.1526	0.0838	3.3173	0.0686	-0.039420	0.859
P_COLL	1	0.1364	0.0974	1.9611	0.1614	0.031988	1.146
OWN	1	-0.2109	0.0851	6.1436	0.0132	-0.049129	0.810
NOPAY	1	-0.1109	0.1752	0.4008	0.5267	-0.012245	0.895
NC_DIST	1	-0.0986	0.1038	0.9022	0.3422	-0.024101	0.906
S_DIST	1	0.0191	0.0967	0.0392	0.8431	0.005157	1.019
W_DIST	1	0.00736	0.1158	0.0040	0.9493	0.001524	1.007
BLACK	1	0.1891	0.1037	3.3257	0.0682	0.032501	1.208
HISPAN	1	-0.5035	0.2233	5.0857	0.0241	-0.049502	0.604
OTHMIN	1	-0.3196	0.2204	2.1019	0.1471	-0.029523	0.726
AGE	1	-0.0712	0.0183	15.1117	0.0001	-0.077839	0.931
SPHH	1	0.00643	0.0827	0.0061	0.9380	0.001515	1.006

APPENDIX E (CONTINUED)

The tables shown below are part of the actual SAS output listings.

Table E-5 - USAF Behavioral Attrition (ATT2) Logit Model Results

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	5929.948	5912.955	.
SC	5936.775	6022.185	.
-2 LOG L	5927.948	5880.955	46.993 with 15 DF (p=0.0001)
Score	.	.	44.440 with 15 DF (p=0.0001)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio
INTERCPT	1	-2.3152	0.3512	43.4527	0.0001	.	.
PSEI	1	0.00336	0.00227	2.1878	0.1391	0.035600	1.003
PSEI_NV	1	-0.1314	0.1733	0.5753	0.4482	-0.017883	0.877
P_NHSD	1	0.1178	0.1271	0.8582	0.3542	0.018660	1.125
P_SCOLL	1	-0.0102	0.0832	0.0149	0.9028	-0.002626	0.990
P_COLL	1	-0.0503	0.0998	0.2536	0.6145	-0.011787	0.951
OWN	1	0.2319	0.0936	6.1446	0.0132	0.054018	1.261
NOPAY	1	-0.0570	0.1976	0.0833	0.7729	-0.006292	0.945
NC_DIST	1	0.2531	0.1063	5.6720	0.0172	0.061867	1.288
S_DIST	1	0.2279	0.1016	5.0285	0.0249	0.061395	1.256
W_DIST	1	0.0467	0.1222	0.1463	0.7021	0.009676	1.048
BLACK	1	-0.4848	0.1257	14.8771	0.0001	-0.083309	0.616
HISPAN	1	-0.4848	0.2231	4.7209	0.0298	-0.047656	0.616
OTHMIN	1	-0.0418	0.2078	0.0404	0.8406	-0.003860	0.959
AGE	1	0.0112	0.0169	0.4414	0.5065	0.012261	1.011
SPHH	1	0.0703	0.0844	0.6947	0.4046	0.016560	1.073

APPENDIX E (CONTINUED)

The tables shown below are part of the actual SAS output listings.

Table E-6 - USAF Behavioral Attrition (ATT3) Logit Model Results

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	8506.886	8502.999	.
SC	8513.713	8612.230	.
-2 LOG L	8504.886	8470.999	33.887 with 15 DF (p=0.0035)
Score	.	.	32.828 with 15 DF (p=0.0050)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio
INTERCPT	1	-0.1329	0.2796	0.2261	0.6344	.	.
PSEI	1	-0.0001	0.00180	0.0032	0.9548	-0.001079	1.000
PSEI_NV	1	-0.0718	0.1272	0.3188	0.5723	-0.009777	0.931
P_NHSD	1	0.0896	0.0991	0.8164	0.3662	0.014192	1.094
P_SCOLL	1	-0.0992	0.0652	2.3125	0.1283	-0.025625	0.906
P_COLL	1	0.0530	0.0775	0.4676	0.4941	0.012432	1.054
OWN	1	-0.00222	0.0695	0.0010	0.9745	-0.000517	0.998
NOPAY	1	-0.1065	0.1440	0.5464	0.4598	-0.011750	0.899
NC_DIST	1	0.0922	0.0819	1.2667	0.2604	0.022528	1.097
S_DIST	1	0.1466	0.0773	3.5937	0.0580	0.039487	1.158
W_DIST	1	0.0304	0.0925	0.1077	0.7428	0.006286	1.031
BLACK	1	-0.1355	0.0874	2.4043	0.1210	-0.023279	0.873
HISPAN	1	-0.5827	0.1686	11.9503	0.0005	-0.057280	0.558
OTHMIN	1	-0.2175	0.1648	1.7417	0.1869	-0.020094	0.805
AGE	1	-0.0346	0.0136	6.4763	0.0109	-0.037865	0.966
SPHH	1	0.0460	0.0655	0.4930	0.4826	0.010828	1.047

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